Blockchain Technology and Sports: The Impact of NFTs in the Sports Industry

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Abstract

Non-fungible tokens are scarce digital assets stored in a blockchain, that can be used to represent unique items related to the most various business sectors. The key value of this concept is the authenticity of each digital asset, since each token is tracible and the blockchain prevents the data from being replicated, offering a secure and transparent sense of ownership to its users. The results of this study point to the commercial potential implicit in the usage of this technology by professional football clubs, as well as a growing potential for the capitalization of this concept through different applications.

Resumo

Tokens não fungíveis são ativos digitais escassos armazenados numa blockchain, que podem ser usados para representar objetos exclusivos ligados aos mais diversos setores de negócio. O principal valor deste conceito é a autenticidade de cada ativo digital, uma vez que cada token é rastreável e a blockchain evita a replicação de dados, oferecendo um senso de propriedade seguro e transparente aos seus utilizadores. Os resultados deste estudo apontam para o potencial comercial implícito na utilização desta tecnologia por clubes de futebol profissionais, assim como um potencial crescente para a capitalização deste conceito através de diferentes aplicações.

Key words: Blockchain; Non-fungible token; Football Industry; Demand; Revenue; Valencia; Milan; Dortmund; Sorare; Strategy; Capitalization; Business model; Innovation; Technology

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1. Introduction

With the pandemic and all the prevention measures that came with it in order to slow down the spread of the virus, most business sectors were deeply affected on a global scale, and the football industry was no exception. This crisis exposed the fragility of this industry and tested its financial sustainability, magnifying the existing flaws in the usual business model of football clubs. With all the income streams affected by the lack of matchday ticket sales, and constraints with the payments from media and commercial agreements, most of these institutions found themselves dealing with liquidity concerns (Sartori, 2021). As a result, sports clubs started to look for solutions that could compensate for the loss of revenues and fan excitement induced by Covid-19, having some of them reshape their business models by introducing alternative sources of revenue, and engagement.

The adoption of blockchain-based assets by some of these institutions, named Non-Fungible Tokens (NFTs), was perhaps one of the most interesting responses that resulted from this pandemic crisis. Furthermore, the fact that this concept is entering gradually in the sports business and causing some interesting changes in the sector, may lead us to question if blockchain and NFT's have the potential to play a bigger role in entities such as clubs, leagues, or companies.

Blockchain is a venturing technology, characterized by its improved ability to verify and record the exchange of value among the users of a network, in a transparent and tamper-resistant manner (Johnson, 2017). Some of the benefits that this technology can bring to a user are based on facts such as it being an immutable digital ledger, which prevents modifications, the security that it can provide through encryption, and of course, the democracy and decentralization that distinguishes it (Afreen, 2021).

Among many other things, blockchain has the capability of storing Non-fungible tokens (NFTs), digital scarce assets that can be used to represent unique items related to many fields such as Art, Music, or Gamming, for instance. Owning an NFT rewards an individual with exclusive ownership over a digital asset due to the features of blockchain technology (CB Insights, 2021). The key value of this concept is the authenticity of each digital asset since each one of them is tracible and the blockchain prevents the data from being replicated.

Following the excitement around cryptocurrencies, another type of asset stored in the blockchain, NFTs are becoming more and more popular among the public in general, mostly due to the fact that this concept enables the combination of fandom with the laws of scarcity, and economics of royalties, representing investment opportunities to consumers (Afreen, 2021).

According to Johnson (2017), if this technology can deliver products and services that improve both the customer experience and the profitability of an enterprise, the organization that uses it may capture a larger and more profitable share of a competitive marketplace.

On this subject, it is interesting to note that this distributed ledger technology is being adopted, among many other sports entities, by European football clubs and leagues, through various manners. The most popular applications of this technology in the sports industry seems to be through the sale of game highlights in the form of digital tokens in the blockchain (Zhang & Germano, 2021), the sale of fan tokens (Cushnan, 2021), and sports digital card collectibles (Lee et al., 2021).

In light of these facts, the present study is focused on discovering the ways and reasons behind the usage of blockchain and NFTs by sports entities, with a special focus on professional football clubs' activities in this field. As such, it aims to find and highlight the different ways that this concept can be used by such institutions, the benefits it can bring, and understand possible prospects for its usage in the sports sector in a near future.

In this regard, the hypothesis that this study aims to test are the following:

H1- Blockchain and NFTs have the potential to become one of the main sources of revenue to football clubs.

H2 – Blockchain and NFTs can only be used by football clubs as a means to raise fan engagement.

H3 - Football clubs currently using blockchain and NFTs have a transversal inclusion of this concept in their business model.

2. An Emerging Technology: Blockchain

After the well-known financial crisis that caused social and economic consequences throughout the world in 2007, the trust in central authorities (like banks for instance) was affected to some extent. This fact originated a new need, especially from the younger generations, to form an economy based on online platforms that would privilege the peer-to-peer contact between two distinct private parties, which would be later traduced in the form of distributed ledger technologies such as blockchain, in 2008 (Garcia-Teruel & Simón-Moreno, 2021).

But what is blockchain? We can characterize it as an emerging technology that enables an improved ability to verify and record the exchange of value among an interconnected set of users, representing a secure and transparent way to track the ownership of assets before, during, and after any transaction. "Block" is the terminology given to each transaction between parties inside the network, whereas "Chain" is the cumulative set of transactions across the entire network: "Blockchain"(Johnson, 2017). In this sense, this distributed ledger technology can provide various benefits to its users such as the stated transparency, but also data security, autonomy, auditability, privacy, immutability, efficiency, speed, and cost savings (Sanka & Cheung, 2021).

It can be described as a secure distributed ledger of interconnected blocks of data arranged in chronological order, that is managed and maintained by the usage of what is known as Consensus Protocols. These protocols are agreements established by the network participants on how to maintain it, by defining the ways in which the creator of a new block is selected (Sanka & Cheung, 2021).

This technology enables any network of users to track and trade in a virtual environment anything of value. The blocks are chained in a way that each one of them can reference the hash of its previous block, and in this way the blockchain is protected against tampering. Moreover, this setup brings traceability to a network, allowing its users to easily detect any modification of the blockchain data. As such, since a change in any block will affect all the other blocks of a given chain, it becomes impossible to tamper data illegally (Sanka & Cheung, 2021).

Skipping the more complex details behind this vast concept, and aiming for a more objective understanding of the distinct possible ways to set up these digital platforms, we can characterize blockchain in three different types.

The first is Public Blockchain. Johnson (2017), explains that these type of networks are open to any person, and is possible to participate in them either in an unlimited , anonymous or pseudonymous way. Each Public blockchain has its own digital, native currency like, for instance, the famous Bitcoin and Ethereum. Native currencies are required as a medium to exchange value inside a public blockchain, and they are needed on this type of network for mainly two reasons:

A. To compensate the "miners", which are the network members who verify the transactions;
B. To claim an underlying asset from its issuer, as they are the medium required to do so.

The second type is Private Blockchain. Johnson (2017), states that this type of network also records the exchange of value between different parties in the network, but its access is permissioned since, unlike the previous example, not everyone can join it. Private Blockchains have the following benefits when compared to conventional centralized technologies:

- Consistency – A blockchain records a history of all transactions within it, and as such, all the network users have an identical copy of the record;

- Democracy – The network that uses the blockchain agrees on and governs its rules and the way it has to be used;

- Security and Accuracy – All the data and information are protected by cryptography, and both digital keys and signatures are required to access the data in the ledger;

- Segmentation and Privatization – Users' digital keys and signatures grant access to the entire ledger, a particular or a set of transactions, and so on;

- Permanent and Tamper Resistant – A centralized point of control is not required to the ledger, plus, the details of all the transactions recorded in the network can't be altered in a retroactively way without the full agreement of the network;

- Quickly updated – Any changes reflected in the ledger, like a new transaction, for instance, happen in near real-time, and every user's copy inside the network reflects these changes in the same time frame;

- Intelligence – Blockchain is a technology that enables the creation of "smart contracts", which are automated event-triggered pieces of computer code that aim to facilitate, verify, or enforce the negotiation/performance of a contract.

The third, and last type, is Consortium Blockchain. According to Cachin and Vukoli´c (2017, cited by Sanka & Cheung, 2021), this type of blockchain is also permissioned, thus its users are known and need the authorization to join. What distinguishes it from Private Blockchain relies on the fact that this type of network gathers a group of organizations that intend to share data having a little trust among its users, and as such, they have to be partially centralized.

As we can easily gauge by the information above, the benefits that this type of platform offers open a lot of room for the development of many potential products and applications in a wide range of different industries (Johnson, 2017).

2.1.Why is Blockchain Useful?

After a succinct understanding of what blockchain is, and what's the potential benefits that this type of network can bring to an industry, we can start to dig deeper into possible ways to deploy this new technology. It appears that today, most current blockchain products and applications are split into three big groups with different purposes (Johnson, 2017):

a. Clearing, payments, and settlement functions in financial services companies, like banks for example;
b. Creation and use of a digital identity within an enterprise;
c. Smart contracts.

This author states that financial service institutions expect areas such as cross boarder payments, corporate payments, and person-to person transactions to benefit from this technology in the short term due to advantages such as lower transaction and capital costs, less propensity to errors, as well as shorter settlement times.

What is exactly a digital identity? According to Johnson (2017), to have a better understanding of this concept, it's important to understand that blockchain enables the creation of a secure,

private, and tamper-resistant “single source of truth” for each customer within an enterprise, which is in short, a customer’s digital identity. Within these digital identities relies the potential to affect the consumer onboarding process, which can be broadly referred to as the first contact between the customer and the enterprise. The purpose of this customer onboarding is basically to collect personal information from the customer and verify his/her identity to an enterprise, and for the enterprise to find new insights that would help it, onboard new customers.

A Smart contract, as mentioned before, is in a simple explanation an automated type of blockchain transaction that can be thought of as event-triggered pieces of computer code. All Smart contract transactions are stored on a blockchain that provides an audit trail of events, as well as an assurance of fulfillment of contract terms. Furthermore, if any user fails or does not fulfill their obligation, the blockchain continues to function with no loss of data integrity (Johnson, 2017).

In this respect, the author addresses possible ways for a manager to use blockchain technology in a product or application, such as:

- Client onboarding
- Trade order or generation
- Regulatory reporting
- Cleaning and settling securities
- Cross border payments
- Compliance reporting
- Management of model portfolios
- Voting of any kind
- Dividend distribution
- Real asset transactions
- Data Storage
- Contracts

It is also stated the fact that potential blockchain applications can reach other industries as well, in the form of customer loyalty programs, Supply chain management, Customer payments, or Inventory controls, for instance.

Most of the applications stated above are expected to reduce many forms of operational waste. In this respect, blockchain has the potential to deliver cost savings to financial services institutions, improve consumer experiences, and enhance the interactions between enterprises and customers.

2.1.2. Obstacles and Weaknesses

According to Johnson (2017), there appears to be a consensus that blockchain offers a wide range of new benefits and features when compared to the conventional methods for exchanging value. Nevertheless, there are still some experts that are skeptical about this new technology. The basic argument against investing in a blockchain project is related to the fact that Financial ledgers can be easily expressed as tables, and the common database tools are more proven tools, typically sufficient for most of the needs.

By now it becomes clear that blockchain has a countless potential but, as most of the other human creations, it also has its weak spots and a lot of obstacles to overcome until its effective mass implementation. Let's go through some of them.

Johnson (2017), states the fact that blockchain technology becomes more valuable as more people use it to do different things. Other things equal, blockchain is a "network effect" technology, meaning that anything has the potential to become more valuable to its users as more users use it. This can be the one of the reasons delaying its global usage and deployment.

Another challenge, maybe the biggest for this technology, is scalability. Despite the success that blockchain technology has been having in a wide range of different sectors. Sanka & Cheung (2021), address the fact that Blockchain systems have lower levels of performance when compared to non-blockchain systems. The rate at which transactions are processed and added to the blockchain network is called transaction throughput. It is stated as an example the fact that Bitcoin and Ethereum blockchains have a throughput of 4 and 15 transactions per second (TPS) respectively, which is considerably slow when we compare them to conventional systems such as Visa (1667 TPS) or PayPal (193 TPS).

Moreover, the read-performance of blockchain servers is pretty low as well when compared to non-blockchain servers like Youtube, for instance, because of the huge amount of data that this type of platform needs to store. This represents another scalability issue when it comes to the adoption of this technology. Currently, the Bitcoin blockchain is over 280 GB, and the Ethereum blockchain is over 562 GB (Sanka & Cheung, 2021).

In this sense, it is considered that the scalability of blockchain is a crucial point that needs improving. But on the other hand, it is difficult to solve the issues related to the scalability of this technology without compromising either the security, decentralization, or trust of the blockchain, the main principles of the foundation of this technology. In this regard, it's clear

that there is always a tradeoff between security, scalability, decentralization, and trust in the blockchain. This is entitled by these authors as Blockchain Quadrilemma, an extension to Burton's Scalability Trilemma. It is complicated to achieve these four properties in a blockchain system in the way the technology is built to this day. As an example, Private blockchains can provide security and scalability, but in order to do so, they can´t be decentralized. Hence, to achieve an optimum solution, optimum levels of these four pillars have to be determined.

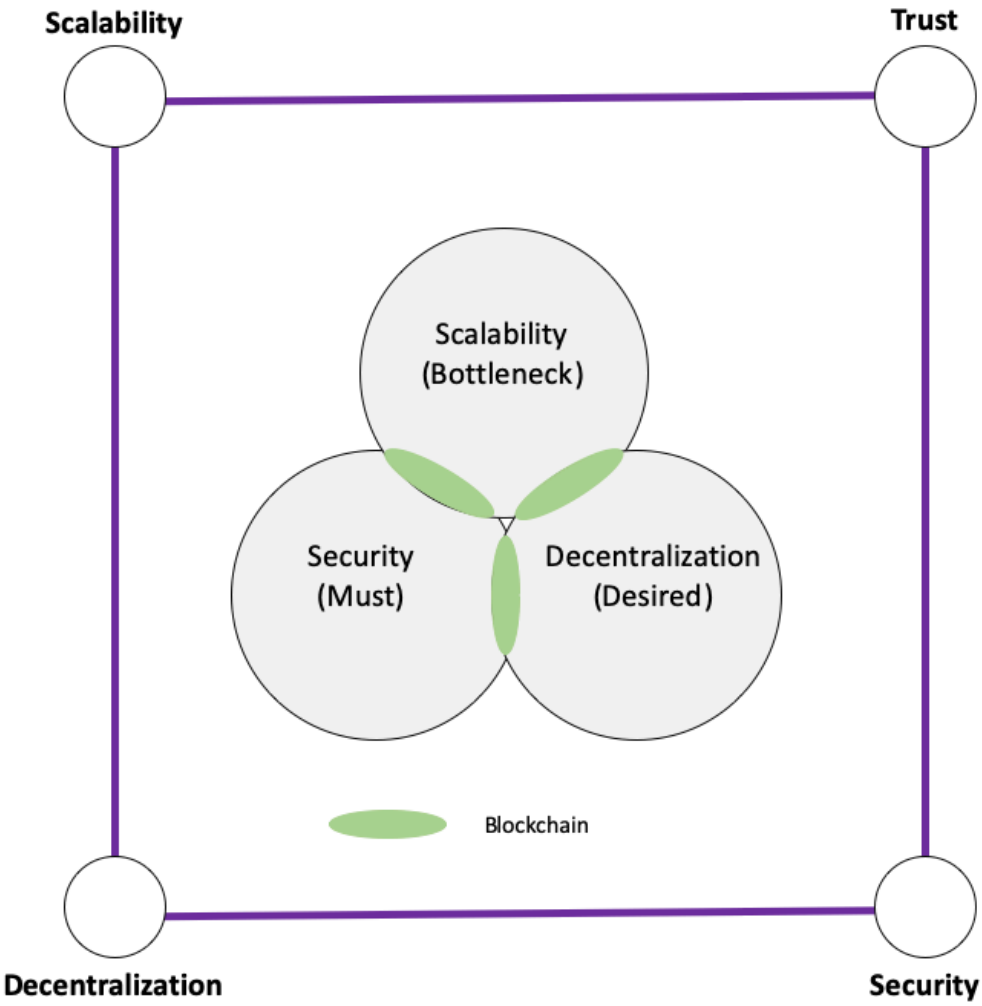

***Figure 1**: The Blockchain Quadrilemma (based on Sanka & Cheung (2021), analysis of the Blockchain Trilemma)*

2.1.3. How Does the Future of Blockchain Looks Like?

The Federal Reserve System in the United States focused its research on payments, clearing, and settlements, in the belief that blockchain technology may represent the most significant development in many years in payments, clearing, and settlement (Johnson, 2017).

Furthermore, Blockchain is expected to mature and achieve mainstream adoption by 2025 (Sanka & Cheung, 2021).

Johnson (2017), points to the fact that blockchain has the potential to improve investment and asset managers' operating business, as each one uses retail and wholesale payment systems, trading platforms, clearinghouses, and settlement systems for securities. In this regard, one could make a strong argument that is possible that blockchain can be the technology that can transform the way that asset managers run the core parts of their businesses. Yet, as stated before, it is still a network effect technology, so its deployment is highly reliable on who uses it and how.

Nevertheless, it is interesting to see that many countries are already using this technology for many different purposes. Estonia keeps health records in a blockchain network, and Georgia uses it to keep its land registry. Japan, Switzerland, and Indonesia already rely on blockchain for identity management, and Singapore to protect fraud in trade invoices. Saudi Arabia and the United Arab Emirates use it for internal banking payments (Sanka & Cheung, 2021).

2.2. Digital Tokens

Now that we know some of the possible ways on which Blockchain can be deployed, and the basic functional principles of this distributed ledger, it's time to focus on the central aspect that is making this escalating technology so popular among the most various communities around the globe – Digital Tokens.

According to Baucherel (2020), a token can be a measurement of value, a non-monetary asset (unique or generic), or a degree of influence in a community. As such, tokens are considered to be a particularly interesting aspect concerning distributed ledger technologies.

As we have seen previously in section 2.1, Smart Contracts are usually the mechanism behind the transfer of value from a user to another, inside a network. This value is exchanged in the form of "tokens", digital assets that have to be created through Consensus Protocols, with the purpose of representing a right. According to the literature, this is a phenomenon called "digital tokenization", and allows the creation of lots of different types of tokens. The tokenization of assets can lead to a lot of benefits, such as cheaper transactions, more transparency in terms of data and information about the issuer, or asset liquidity increase (Garcia-Teruel & Simón-Moreno, 2021).

Baucherel (2020), explains that tokens with different properties are often referred to by the reference number of the relevant Ethereum Request for Comment (ERC). In between the vast number of different protocols that allow the creation of distinct tokens, two types deserve our special attention in light of this study – protocols ERC-20 and ERC-721.

2.2.1. Fungible Tokens

When we talk about fungible goods, we refer to items that are exchangeable among different parties due to their identical attributes and practical purpose. These are exactly the characteristics of the tokens generated through protocol ERC-20 – fungible tokens - which happen to be the native currencies of most of the commercial blockchain platforms. These tokens are more commonly known as cryptocurrencies, and all these digital assets are identical and divisible which allows us to refer to them as digital programmable money (Baucherel, 2020).

The first decentralized cryptocurrency was launched in 2009 by Satoshi Nakamoto (a pseudonymous adopted by the original creator) and goes by the name of Bitcoin. The invention of a token of this nature inside a platform like blockchain represented for the first time the possibility of making transactions that could be recorded and processed without the involvement of a central processing agency (Baucherel, 2020). Instead, the transactions are recorded on a block and distributed through all the blockchain ensuring that no involved party can reverse them (Hewa et. al, 2020).

Nowadays there are several types of different cryptocurrencies that can and have specialist functions depending on their placement in the digital ecosystem, being the ones with a pseudonymous nature the most popular among the users. The already mention Bitcoin, and also Ethereum are to this date the two most popular digital coins. Moreover, these coins are walking each day towards becoming a real alternative medium for the exchange of value, especially in countries with unstable currencies and poor access to banking facilities (Baucherel, 2020).

2.2.2. Non-Fungible Tokens

Other platforms have contributed to the creation and adoption of another type of token generated through the protocol ERC-721, known as a “one of a kind” token. Each one of these digital assets is still exchangeable, but its value varies according to its specific characteristics,

uniqueness, and rareness. Other things equal, we can then say that this kind of tokens are "non-fungible", meaning that each one of them represents a unique collectible that has its value determined by both its properties and the perception of the buyer (Baucherel, 2020).

In this sense, non-fungible tokens (NFTs), can be traduced into any kind of digital asset. Collectibles and artworks, objects in virtual environments, and digitalized sports characters are in between the most common examples of NFTs that can be traded in digital marketplaces. Unlike cryptocurrencies, these digital tokens are intended as pure assets. The term non-fungible in the name is a good indicator of this difference. Fungibility is one of the defining characteristics of money and cryptocurrencies, as one dollar is the same as another dollar, and one bitcoin is the same as another. But the non-fungibility of an NFT is one of the key characteristics that justify its value as an asset (Dowling, 2021).

As such, NFTs are considered to be a disruptive concept that can be transferable to various sectors. Disruptive, because they represent something that would not be possible without blockchain technology. Moreover, the ownership of this type of asset is undisputed because tokens, unlike physical assets, can be programmed, and this leads us to the concept of interoperability of tokens, which is another strength of blockchain technologies when compared to the conventional systems (Baucherel, 2020).

A good example of an NFT is CryptoPunks, one of the largest single traded markets in the NFT world, with records of about $200m in trades through its lifetime. The start of this market was in 2017 and was characterized by the creation of 10,000 unique digital characters that were registered as digital assets on the Ethereum blockchain. Each of these characters was trading for $50 to $100 until April 2020. After that period, prices started rising at an incredible rate, presenting trades with values between $20,000 and $100,000 for each individual NFT by February and March 2021 (Dowling, 2021).

The demand of NFTs is increasing in a clear way, and with it so as the supply by the constant creation of new projects. In August 2021, the total volume of NFT sales surpassed the $5.29 billion, representing an increase of 319% month-over-month, as can be seen in the graphic bellow (Herrera, 2021):

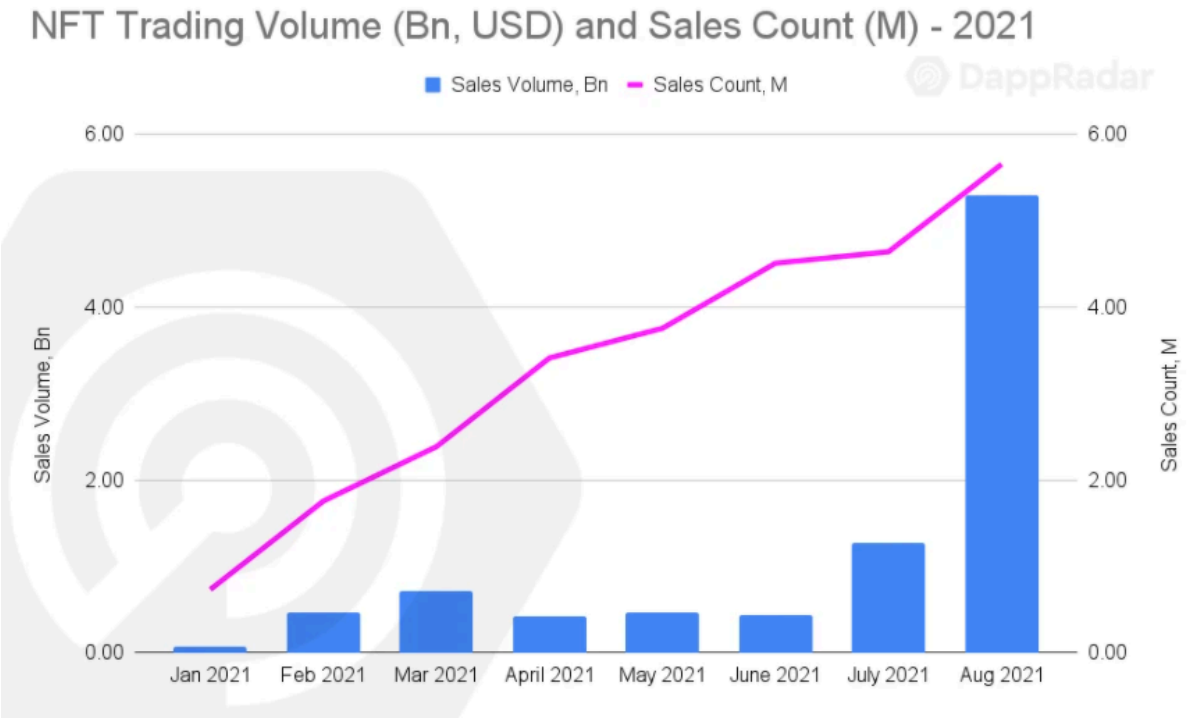

***Figure 2**: The expansion of the NFT market according to DappRadar*

An NFT starts with the registration of ownership of a digital asset in a given blockchain, which is in most cases, an Ethereum network. This digital asset can be purchased through cryptocurrency payment, changing its ownership in the network once the payment is registered on the blockchain (Dowling, 2021).

It is for such evidence, that there is the need to acknowledge that with blockchain new behaviors are emerging and this will have an impact on the future of our everyday lives. The fact that Industries have been exploring the use of NFTs has taken the concept and run with it to introduce decentralized ownership and lay the foundations of a new economy, which will also represent new implications for business models and commercial behavior in the future (Baucherel, 2020).

2.3. NFTs in the Sports Industry

With the pandemic and all the precaution measures that came with it to prevent the virus propagation, most business sectors were deeply affected, and the sports industry was no exception. As we know, the sustainability of professional sports clubs and leagues is extremely reliable on matchday ticket sales. In the 2019/20 season, the first to be impacted by the pandemic, measures such as the ban on entry of supporters in the stadiums, or the cancelation of several games, were applied, and with it, an important source of income for these entities was seriously affected. Real Madrid, for example, was one of the most tackled Clubs in this field, reporting a 22% year-on-year drop, which represented a loss of €34,9 million, only in that season (Sartori, 2021).

In light of this evidence, we can say that the pandemic crisis exposed the fragility of the football industry and tested its financial sustainability, magnifying the existing flaws in the usual business model. With all the income streams affected by the lack of matchday ticket sales, and constraints with the payments from media and commercial agreements, Clubs found themselves dealing with liquidity concerns in a trice (Sartori, 2021).

With this crisis, some tendencies aiming to maintain liquidity started to emerge, and it's interesting to notice the fact that the beginning of the inclusion of blockchain and NFTs in the strategy of some top football clubs in Europe coincided with this abrupt season on which revenues and the interaction with the fans suffered a considerable blow.

Following the global growing trend of cryptocurrencies, football clubs started to develop partnerships with companies such as Sorare or Socios.com, for example, digital marketplaces that focus their business model in the sale of digital assets inside an environment based on distributed ledger technology. The adoption of such measures represented a new way to reach, the at this stage unreachable fans, and transform the way that they could engage with their favorite clubs.

It is curious to acknowledge how blockchain and NFTs also started to be adopted by other sports in the last couple of years. Motorsports, MMA, American Football, and Basketball are some of the examples of sports industries that are currently using this technology in the most different ways. From "digital stickers" and membership perks, to having professional athletes releasing their own NFTs as a means of investment.

Even though it is considered that the stabilization of the NFT market might take a couple more years to take place, by the time this happens, these digital assets are likely to become an important application of technologies with the potential to enhance the business of sports as well as the fan experience in the sector (Deloitte, 2021).

In this respect, the following sections intend to showcase the three most common ways that sports entities of all kinds are using blockchain and NFTs.

2.3.1. Digital Content Pieces

Professional Sports leagues have profited billions throughout the years by taking a cut from licensed items sold to fans and collectors. Today, the National Basketball Association (NBA) is taking this to a whole new level, by selling game highlights to fans in the form of digital tokens on the blockchain (Zhang & Germano, 2021).

Such innovation turned out to be possible due to the growing development of technology, since, because of it, media tended to become more and more fungible with time. Nowadays, anyone who as access to a smartphone can easily share, copy or distribute any type of content, and as such, NFTs brought the possibility to apply scarcity to both digital and analog contents. This fact opened the space to allow fans to become the unique owners of media in the most various forms (Deloitte, 2021).

In this respect, the company Dapper Labs, founder of the successful CryptoKitties (one of the first blockchain games to ever be launched), partnered with the most famous Basketball league in the world to develop a platform called NBA Top Shot, in 2019. Its popularity increased significantly during the last year, to the point that a 12 seconds-long highlight from LeBron James dunk resold for more than $200,000 (Zhang & Germano, 2021).

In short, Top Shot takes the usual weekly NBA highlights, encrypts them in the form of an NFT, and allows consumers to trade them in an online marketplace licensed by the league. A serial number is given to each token, and each of these is sold in limited edition “packs”, whose prices vary from $9 to $230 depending on the moments they contain. Afterward, on the secondary market, collectors can buy and sell moments from each other. Moreover, this tendency has led to the record of values above $300 million in sales since the platform public launch in October 2020, as shown in the graphic below (Zhang & Germano, 2021):

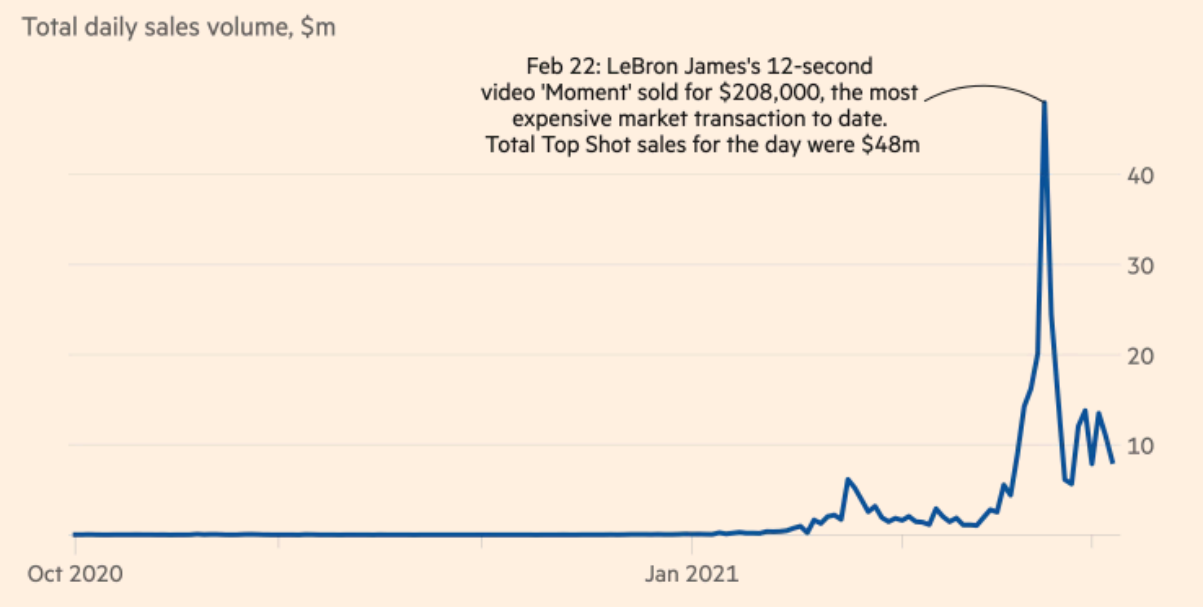

***Figure 3**: NBA Top Shot's 1st semester digital record sale (Zhang & Germano, 2021)*

Besides the fact that a fan can be the exclusive owner of a digital sporting collectible, another benefit of owning such an asset in the form of a sports highlight is that it can be shown off. In this respect, it can bring to its owner a degree of status of some sort, if not just a simple sense of belonging. It is due to such benefits, along with the possibility of generating profit, that in May 2021 about 500,000 basketball fans had already entered the NBA Top Shot world (Deloitte, 2021).

Zhang & Germano (2021), state that the revenues generated from the sales of Top Shot packs are split between Dapper Labs, NBA, and the players' association. Furthermore, these three parties also split a 5% cut of each token exchange on the secondary market.

According to these authors, the goal of Dapper Labs seems to be focused on the development of a product that can go beyond the already existing cryptocurrency community, getting also "regular people" to engage.

This concept is expected to bring revenues to sports leagues and clubs/teams, in the short-term, from the content generated from the games (weekly), and in the long term, by the increase in the steadiness of the NFT stock thanks to the rise of the trading volumes, which should represent more revenues from the commissions of each digital asset traded (Deloitte, 2021).

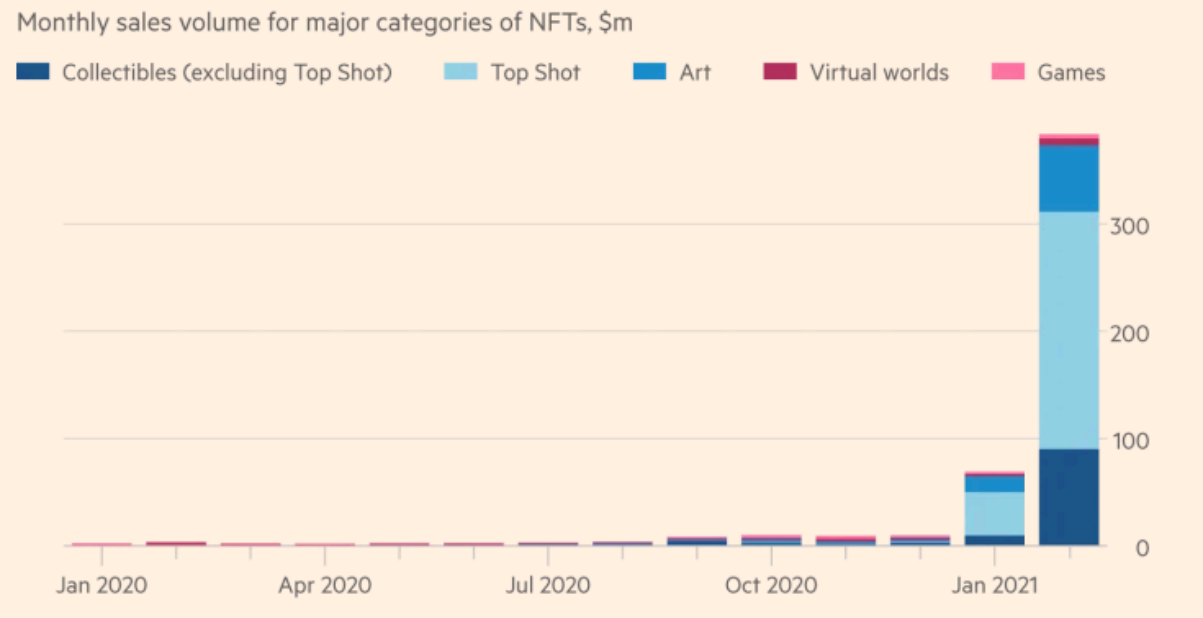

***Figure 4**: The way Zhang & Germano (2021), view the growth of the NFTs' major categories*

Another interesting example of a similar usage of NFTs in the sports industry happened recently in the motorsport world. The 2021 Formula 1 season was marked by the return of Aston Martin to the competition. Following the general excitement around such happening, the team partnered up with Crypto.com, a trading platform, on the development of digital tokens meant to be sold to fans. These assets were based on short recordings from the moment that the Aston Martin's car returned to the track more than 80 years after the last time and on slow-motion pit-stop films. In this regard, 1500 digital tokens were released initially, and all of them were sold in less than 24 hours (Cushnan, 2021).

2.3.2. Digital "Fan Stickers"

Within the licensed items sold to fans and collectors stated in the section above, relies a concept that has been a tradition for sports fans for more than 30 years – the collection and exchange of sports cards and stickers. With the arrival of Covid-19, the purchase of goods online increased considerably, and following this tendency, the sports memorabilia market was marked by eBay's outstanding report of a 142 percent growth on sports cards sales in the website, from 2019 to 2020 (Finn, 2021).

It is interesting to note that, following this "tradition", some companies have started to bring this concept to the digital world. Today these collectibles are also being offered to consumers

in the form of NFTs, with a value proposition mostly based on a more secure sense of ownership through blockchain technology.

In Europe, the player leading this emerging market is Sorare, a French startup that built an ecosystem based on Ethereum blockchain, on which the concept of collecting sports cards is merged with football fantasy games. In Short, the platform allows the users to collect and trade digital sports cards from their favorite football players in the form of NFTs, and participate in virtual tournaments with teams based on their card collection. Points are awarded to each football player based on his real-life performances, and the user who builds the team of collectibles that gathers the most points in a week wins the tournament.

A series of collectibles from the same football player are released on the platform with different levels of rarity, introducing distinct layers of scarcity to the NFTs, and increasing the demand for the rarer assets.

Sorare raised $680 million in funding, representing a record amount for a single fundraising in the French tech sector, and has now a valuation of $4.3 billion (France 24, 2021). Such appraisal caught the attention of a lot of professional football clubs, and the company managed to partner up with 215 of them so far.

In the United States the 80-year-old company Topps, known for selling physical collectibles including sports cards of all kinds, is shifting to a digital approach, raising its investment in blockchain and NFTs to take advantage of the flourishing market for crypto collectibles (Nelson, 2021). Among the NFT collections that the company has now available on its digital marketplace, there are two connected to the sports industry, namely the exclusive NFT collections of the Major Baseball League and German Bundesliga.

2.3.3. Fan Tokens

At this stage, it is relevant to address a third type of token, that has been gaining acceptance within the Sports Industry with time – Utility Token. A token of this kind provides a specific utility benefit to its holder, that can only be enjoyed in the platform/company that issued it (Garcia-Teruel & Simón-Moreno, 2021). The functionality of this type of token can be thought of as a casino chip or a voucher, for instance, in the sense that it represents a necessary tool/mechanism for using the application in question (Stobox, 2021).

From this type of token drifted the concept of Fan Token, an asset that grants exclusive benefits to the users of a given platform, by being holders. In the Sports Industry, these tokens concede the user the right to vote on decisions regarding the club's future, as well as access to membership perks based on exclusive experiences. The more Fan Tokens of a specific club a user holds, the higher his/her influence will be in certain decisions related to that same club, and the more perks he/she can obtain.

The biggest provider of this type of token in the Football industry is Socios.com, a company that developed a model from which fans can buy the Fan Tokens of a total of 52 football teams, and gain benefits from it. The world's largest crypto exchange, Binance, also owes a share in this market composed of the sale of the Fan Tokens of Lazio, FC Porto, and Santos FC. Paribu, a Turkish crypto exchange, is also part of this market by issuing Fenerbahçe's Fan Tokens.

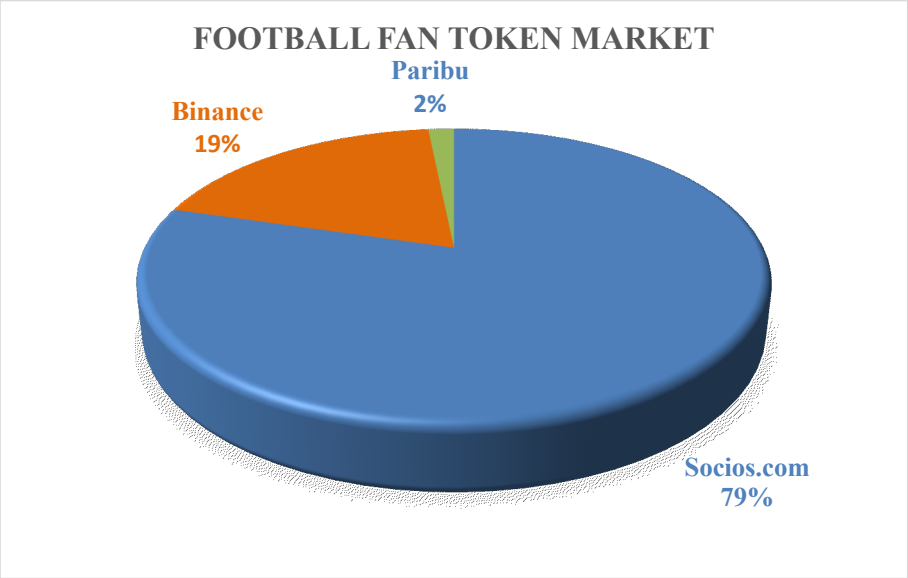

***Figure 5**: Football Fan Token Market, according to FanMarketCap as of 28/12/2021*

Following a similar model, the Formula 1 team McLaren partnered up with the crypto exchange Bitci.com, on the development of Fan Tokens. The goal of such a project is identical to the example above – Sell these assets to fans as a means to provide them benefits, as well as access to exclusive content (Cushnan, 2021).

3. Methodology

The present study is focused on discovering the ways and reasons behind the usage of blockchain and NFTs by football clubs. As such it aims to find and highlight the different ways that this concept can be used by such institutions, and understand possible predictions for its usage in the Sports Sector in a near future.

Given these goals, it was considered that conducting a qualitative study would be the best way to showcase the information collected. In this sense, the data was gathered through four interviews via Microsoft Teams. Three of which were conducted with the professionals responsible for matters related to blockchain and NFTs in Valencia CF (VCF), AC Milan (ACM), and Borussia Dortmund (BVB), professional football clubs competing in some of the most prestigious championships in the world. From the VCF side, the interviewee was Josep Borrell, the Commercial Strategy Coordinator of the club, whose tasks consist in the definition of the strategy of sports sponsorships, by searching for international brands to bring higher exposure to the club. As for ACM, the interview was conducted with Giorgia Buizza, the club's Partnership Account, whose responsibilities rely on the management of ACM's sponsor portfolio, the activation of each sponsor's contractual rights, and the study of tailored activations for the club. Regarding BVB, the interviewee was Alexander Mühl, the Head of Digital Innovation and E-business of the club, whose tasks consist in the implementation and development of BVB's digital strategy, which includes the responsibility for the digital platforms, website, apps, and all the strategy behind it.

The fourth interview aimed for a deeper understanding of this concept from an NFT provider's side. In this sense, it was conducted with Grégoire Mouton, Sorare's Club Activation Manager, whose job consists in being the main point of contact with the football clubs that the company has under contract, and to propose them ideas regarding Marketing Activations/Communication, aiming to increase the visibility of the company.

Interviewee	Club/Company	Position
Josep Borrell	Valencia CF	Commercial Strategy Coordinator
Giorgia Buizza	AC Milan	Partnership Account
Alexander Mühl	Borussia Dortmund	Head of Digital Innovation and E-business
Grégoire Mouton	sorare	Club Activation Manager

***Figure 6**: Interviewees' Synthesis*

The research philosophy adopted was based on Interpretivism, meaning that the researcher opted to play a role in observing the phenomena that is currently happening around the topic that is the center of the study. Hence, this investigation is of an Inductive character, since it aims to generate a theory from the data that was collected through an exploratory approach.

Regarding the strategy used, the choice fell into conducting an Ethnographic research in order to observe and record the different experiences, perceptions, and strategies that each of these different entities might have regarding this fairly recent topic in the sports industry. This path was chosen because it was considered that under the circumstances on which the study was conducted, it would be far more valuable to collect detailed information from specific agents actively working on the field, than to try to quantify somehow the usage of NFTs and blockchain of each one of these institutions.

Therefore, given the goals of the present study, it was considered that the best way to collect data was through the conduction of interviews with the agents responsible for matters related to the usage of NFTs and blockchain in each club. In this sense, a list of questions based on the information collected from the literature review was created, composing a script that was transversal to all interviews, with changes only in the name of the Club and its respective partners in question.

The selection of the clubs who took part on this study was made with the help of PUMA's Teamsport Business Unit, through a research on sports entities already including blockchain into their strategy, generating a list of potential candidates for interviewing. Afterwards, in the attempt of speeding the process of selection, the football clubs of the list who have a partnership with PUMA SE were identified. An email was sent to the Partnership Managers of the clubs, which in turn came back with the contacts of the professionals interested in interviewing.

Following the interview period, a Content Analysis was made based on the answers that each of the interviewees gave to each question.

The Methodological Limitations of this study are mostly based on the fact that the study object was related to a fairly recent technology, and thus, many entities didn't considered to have the expertise necessary to have discussions about it. This was a factor that affected the amount of interviews that was possible to conduct, since many clubs where approached in this sense, but only a few felt confident to talk about these themes. As a result, the number of interviews that are included in this study was limited.

Nevertheless, the interviews that were possible to conduct featured three of the most relevant football clubs in the world , and also the leader in the market of digital football collectibles, so the input that it brought to the work was considered to be rich and relevant in terms of content.

Moreover, due to the newness of the concepts treated in this study, it is at the present moment difficult to find relevant academic research to fundament some of the facts that are important to be addressed, as there are still no published investigation results. As such, part of the research was based on articles found on non-academic trustworthy sources of information.

4.Discussion

4.1. Sorare, the company

When asked what is Sorare and how it started as a company, Grégoire explained that the company started at 2019 as a product of the vision of the two co-founders who were interested in the increased value that blockchain was starting to bring to certain markets. In the United States, Top Shot was one of the platforms who raised the highest interest to these entrepreneurs, and from there a new trend was identified. Questions regarding the possibility of venturing such potential in the European market started to pop up, and the result was the development of a system on which the users could trade NFTs.

Today, Sorare is a digital marketplace focused on football, on which the users can buy NFTs of their favorite players. What makes it special is the fact that it's based on blockchain technology, meaning that when the user buys a NFT it is an exclusive, unshared and tamper resistant digital item, turning him/her the owner of one particular asset. Furthermore, Grégoire stated that there is the implementation of a scarcity logic on all the NFTs that are launched in the platform every year, meaning that there is a limited amount of digital assets that are created, aiming to emphasize the exclusivity of the ownership.

Inside the platform, users can buy collectibles of their favorite players, and build a team within their collections to participate in tournaments of football fantasy games. These games are based on the performance grading of football players in real life, and through the assembly of each team of collectibles the users gets more or less weekly points depending on the performance of the players picked to his/her team. The users with the most weekly points are rewarded with either some additional NFTs, or money. This is viewed not only as a leisure aspect in this platform, that can bring engagement, but also as an incentive to buy more and better player collectibles with time.

4.2. How/When it Started for Football Clubs

With regards to how/when have the club started with Blockchain and NFTs, Josep explained that Valencia CF started to be in touch with this digital world about one and a half years ago, when they sign the first contract with Sorare. The club was one of the first ones in Spain to have such a partnership and sell its digital stickers in this online ecosystem. After that Valencia has been having an experience also with Socios.com, one of the current main partners of the club

for the past year, launching this way the club's first ever fan tokens. At the moment the club also works with Dapper Labs, given the fact that this company is now a partner of LaLiga, and on this behalf the main focus is to sell gameday highlights in the form of NFTs.

According to Josep, the reasoning behind the inclusion of this concept in the club's strategy has to do with the need that Valencia has to adapt itself to new technologies, and to give fans all over the world new forms to interact with the club, that didn't existed before. VCF has a huge fan base, and was struggling to interact with it, especially with the fans overseas. The adoption of NFTs, more specifically through the partnership with Socios.com, helped in that sense enabling this type of fans to also have a higher sense of belonging with VFC by interacting more regularly with the club. This measures helped somehow to break the existent distance barrier, and increase the club's revenues though this channel. In this way, Valencia can be connected with this type of fan that it always had, with a closer relation.

From the AC Milan side, was interesting to note that unlike the case above, the adoption of NFTs was not included in a specific strategy. Giorgia explained that it all started when the club was approached by Socios.com just a couple of days before the launch of the club's first ever digital token. Hence, the beginning of this partnership was characterized by only two days of hard work aiming for the launch of ACM's first ever fan tokens, as well as other 100 exclusive NFTs on Socios' digital marketplace, each of them with a serial number and protocolled.

Giorgia considers that the idea behind these ACM exclusive NFTs is something different from what can be seen for instance, in the US market, where NFTs can be traded and bought through an auction. For ACM's case, fans don't have to buy an NFT. Instead they become eligible to gain such an asset, based on the amount of Fan Tokens they hold. A good example of this evidence is the last time the club awarded fans with exclusive NFTs. In order to be eligible, they needed to hold at least 10 ACM Fan Tokens.

Furthermore, ACM takes a lot of pride of such a partnership because it was actually one of the first clubs to belong to the company's portfolio.

With respects to BVB and the status of its journey with NFTs, Alexander states that the club hasn't started any NFT activity yet, but they consider that there's definitely a lot of movement in the market. As such, Borussia Dortmund is aware that this is a technological innovation that will most definitely have a major impact in the business models in the sports industry.

What the club isn't so sure at the moment is actually how fast and big the impact of this concept will be in the sports industry in terms of the adoption of this technology from the clubs' fan base. It is considered that the development of the NFT concept is hype based, which leads to clear indicators of potential, but BVB still looks very carefully to questions like the accessibility of the technical solution based on such a concept.

In this sense, there has been a lot of internal discussions in the club, leading to various projection of a lot of scenarios, but the most important for BVB is to understand the user experience, aiming to find out if this concept can be something only for the cryptocurrency enthusiasts, or if it can transcend this type of users. In other words, trying to understand if this is a concept that is proven to alienate the regular consumer, or not.

4.3. The Current Usage of NFTs by Football Clubs

When it comes to the way that the club is using NFTs, from the Valencia side Josep says that at this moment the club's Blockchain "star product" is the VCF Fan Token in Socios.com. The company is one of the main sponsors of the club, both parties had established a strong relationship with one another, and as such these fan tokens are advertised in the player's jerseys during the matches. The process works through the launch of various poles of different nature in the platform, in order to allow the owners of Valencia's fan tokens to take decisions related to the club. As an example, Josep remembered the one time that the club allowed the fans to decide through the platform, which design would be showcased in the chest of the jersey that the players used to compete in the Copa del Rey. Socios.com allowed the club to launch a pole with 5 different sketches, and the most voted one was selected.

Fan Token Offering (FTO), is the name given to the first launch of exclusive tokens by a club. According to Josep, Valencia started by launching 1 million Fan Tokens in Socios.com, retailing for 2€ each. From the sale of each of these tokens, there's an economic benefit to both Socios, and Valencia.

When it comes to the strategy with Sorare, Josep says that this partnership came as a good opportunity to generate interesting increases from both economical and fan engagement perspectives.

When VFC sells its digital player stickers through this platform, a commission is charged for each sale, monetizing and capitalizing a fan base that the club didn't have before. Through this

process, the club has the potential to profit not only from its fans but also from any other ordinary user in the Sorare ecosystem. Moreover, adding to the fact that the club charges a commission for each transaction that is related to it, Sorare also has to pay a fee in order to be able to use the club's rights in the NFTs. Josep says that this is a new form to bringing revenues to the club, which is turning out to be really profitable.

Sorare's business model is based on partnerships with football leagues and clubs, aiming to buy individual property concerning the image rights of the football players. This enables the company to produce NFTs based on all the different clubs and players, and afterward sell them on Sorare's digital marketplace. In the end, the company profits by taking a commission from each sale of a digital asset.

Valencia wants to be seen from the outside as a disruptive and innovative club, and as such commitments are being made with different types of NFT Companies in order to pass the message that this is a club that can easily adapt itself to the new times we live in, and the technologies that come with it.

As for ACM, the club's strategy behind NFTs is said to consist in giving fans a further reason to be fan token holders. By being so, they have specific rights such as exclusive experiences or have some sort of influence in the life of the club by participating in decisions regarding its future. In this sense, the exclusive ACM NFT is meant to be an asset that empowers the status of the fan token holders.

Giorgia explained that other than this there is nothing else going on in the club in terms of NFTs, but there's the need to understand how are these digital assets are going to perform on the market in the future because it is expected from the club that at a certain point, the fans that own these 100 unique digital assets, will be able to trade them somehow.

The intention of AC Milan is to have at least more 10 exclusive NFTs being released on the Socios' marketplace until the end of the 2021/2022 season, and in this regard, agreements between the company and the club are being settled.

In order to generate these NFTs, the club needs to provide pictures with specific characteristics to Socios, given the contract that the club has with this company. Giorgia stated as an example the fact that each of these pictures needs to include at least four players, otherwise we would be talking about single athletes' image rights, something that ACM doesn't hold at the moment

for its players. Afterward these pictures are transformed into unique digital assets in the form of digital stickers.

Both Socios and the club owe a revenue share for each new token that goes into the market, and this is the basic way that ACM can generate income from this platform. Furthermore, AC Milan also takes a small percentage around each transaction of ACM Fan Tokens that occurs in the secondary market.

The club gets the best benefits from this technology by finding ways to increase the demand for fan tokens, and this is one of the reasons why there are always limited amounts of digital assets produced by Socios.com. As of November 2021, ACM had released around 10% of the total amount of fan tokens created with Socios.com, and in this sense, the challenge for the club is to release on the market the remaining ones in the coming years, maintaining at the same time high levels of demand.

When it comes to the club's plans for the future regarding NFTs, Giorgia explained that due to the newness of this concept ACM doesn't have concrete plans yet. What the club intends to do at the present stage is to analyze how the current NFTs, and the ones expected to be launched soon, will behave in the market, and from there understand if these digital assets are indeed valuable to the fans, or not. In this regard, it is considered that only numbers can give the club a measurement of its effectiveness, so a plan is already set in order to collect and analyze data regarding the first two releases of ACM NFTs, and make some conclusions based on the results. Nonetheless, it is expected that the real impact of the adoption of this concept will only be possible to acknowledge at the end of the present season since it is not known yet by the club what NFTs really represent to its fans.

Regarding BVB's strategy, Alexander explained that in alignment with the way that the club sees the brand Borussia Dortmund, the club doesn't want to give rise to such a tool to be used by speculators to use somehow the name and image of the club as a toy. Nonetheless, a lot of concepts that the club has already seen related to NFTs, are considered to be in the end just a transformation of activities that are already being done by clubs in the physical world. The concept of NFT is just considered as a way to bring this logic into a digital world. In this sense, the club wishes to start with activities of this nature, but in a way that can offer value to as many BVB fans as possible, and not only for a small minority of enthusiasts.

In this sense, the most important strategic guideline for the club is based on the understanding of whether these NFT solutions will be open and usable for also the fans who are not really in the crypto space. Accessibility is said to be key to BVB.

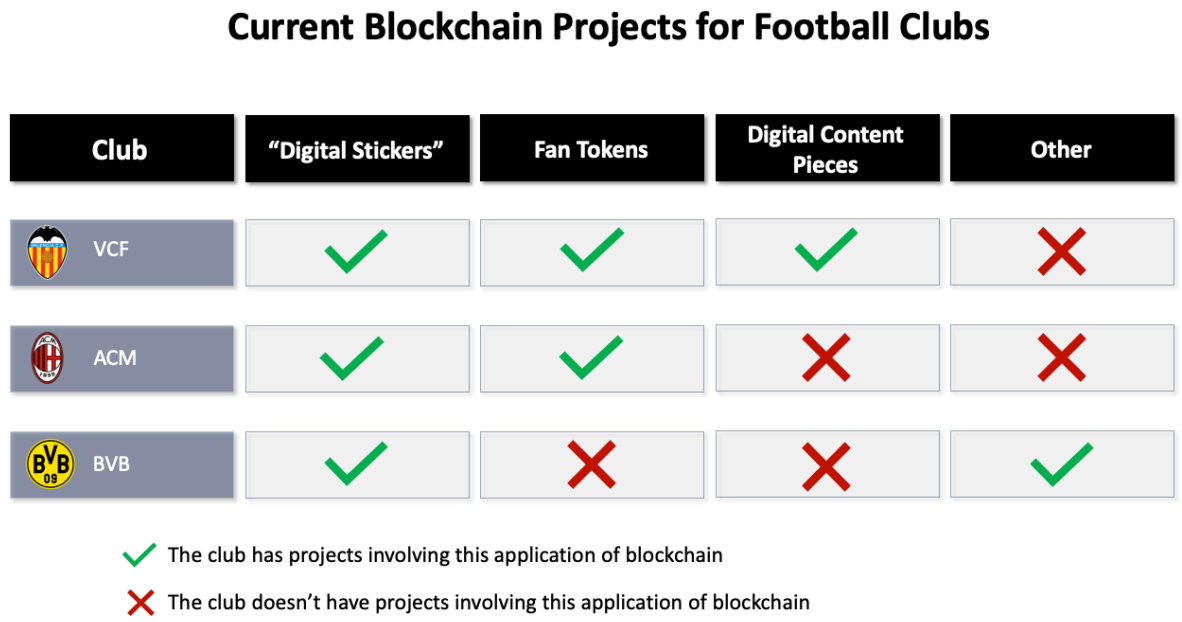

***Figure** 7: Current Blockchain Projects for the Football Clubs Interviewed*

4.4. Partnership Goals

When it comes to what the club is trying to achieve through a partnership with a company like Socios.com as a main sponsor, Josep explained that, for Valencia, first of all, is to be seen as a disruptive and innovative club from the outside, and second to try to find a good way to allow the club to differentiate itself from others. Regarding this second objective, Josep points to the fact that it is really difficult for a football club to be perceived as different, because in the end all teams are there to play, score goals, leading to more and less successful seasons. In this sense, it is considered that the best opportunities for the differentiation of a football club come from outside of the pitch, by bringing technology and flexibility to the strategy's structure. Socios.com is important for Valencia CF in this sense since it helps increase revenues and raise awareness to the club through a lot of different channels at the same time, changing the way that it is seen from the outside.

When it comes to AC Milan, Georgia says that for the club this platform can be seen as a kind of membership program, given the fact that the purchase of a fan token by the user brings him/her certain rights related to the club. In this sense, the club is taken advantage of what

Socios.com developed so far, by trying to attract as many ACM fans as possible to the platform. Nonetheless, the club is aware of the fact that probably the very first ACM fan token holders were not necessarily ACM fans, but rather cryptocurrency enthusiasts. In this regard, the challenge for ACM is considered to be the development of a product that can also be interesting to the average club fan, which is not easy, since there's the need for the integration of a third party (Socios), in the club's processes when it comes to marketing, retail, or ticketing, for example. Nevertheless, the club is hardly working to put this idea into place, and the fruits of this effort are expected to be seen in the years to come.

Giorgia explained that at the moment, Socios is already considered a very important partner, since the revenues generated for the club by this partnership last season were appraised as really high.

It is also interesting to note that the beginning of the ACM fan token was marked by a lot of enthusiasm from the fans' side, and consequently, this concept is something that is already being linked to the sports performance of the team. According to Giorgia, it seems that the token sales vary according to the club's weekly sports results, and in this regard, it is acknowledgeable that at a certain point, if a Marketing Manager deals with a football team, his/her work is highly dependable of its results on the pitch.

In this respect, the commercial team is working hard on running actively this partnership with Socios, but in short, the idea to keep is that the better the football team performs, the more money the club will generate from all sectors, including NFTs.

As for BVB and its objectives from a partnership with a company like Sorare, Alexander explicates that in the aspect of developing NFTs as collectibles, at the moment the club has a partnership not only with Sorare, but also with another company named Topps. It is considered that both companies take an already existing mechanism of fan engagement, either collecting things or interacting with subjects related to the club through a logic based on gamming principles, and then they transfer it to the digital space through the NFTs. In this sense, these are the first spaces on which BVB wants to move forward when it comes to the adoption of blockchain, due to the fact that business models and fan engagement methods based on this logic are already being put into practice.

Nonetheless, there are also some negative aspects related to the adoption of NFTs by football clubs, and one of them is related to all the bureaucracies around the rights needed to develop a

digital asset. Alexander refers to it as a "nightmare". To give some context, the interviewee explained that companies like Sorare or Topps not only have contracts with football clubs but also with the professional football leagues (in the case of BVB, the Bundesliga). This third party owes the rights to give away information related to the club, such as logos, footage, or video material, for instance, and in the light of these facts, BVB always has to consider what kind of digital assets is the club really allowed to promote, since the League owes all these rights.

As such, the club chose to team up with companies who were already offering a digital ecosystem in the market, given the fact that these players already owed both League rights, and an already existing userbase, representing a functional business model. By taking such measures, the club aims to (1) learn more about the market and logic of NFTs, to understand if it's a safe business model, (2) understand how BVB fans react to this kind of activations, given the fact that a club with such a heritage has a fanbase really critical and sensitive to commercial developments, and (3) of course, looking for additional income.

Looking into an NFT company side, when it comes to the criteria that Sorare has to pick up partners, Grégoire explained that since the company aims to be the leader of this market, it looks for partnerships with the major football leagues in the world. In this sense, the first big step was to secure a partnership with the Spanish La Liga, and the German Bundesliga, since it is considered to be easier to go for leagues at a starting point than to go for one single football club at a time. By owning the rights of a league, the company automatically owes most of the rights that it needs from each club that composes it, for the production of NFTs.

The company started with partnering up with the Belgium Pro League, followed by the Dutch Eredivisie. Grégoire pointed to the fact that at that stage, the French league wasn't so much into NFTs, so the company started to build up partnerships club by club. As such, the strategy was to go for the most popular clubs like Paris Saint Germain, or Monaco, since it was considered that once the company would start gaining visibility from the bigger teams, all the others would follow.

Moreover, in the process of securing partnerships with these entities, gaining exclusivity was considered as key for Sorare. By doing so, the company was preventing other players from coming to the market, and successively blocking competition. This is part of the reason why in Spain, Sorare tried to quickly secure the biggest teams like Real Madrid or Barcelona.

In this sense, Sorare targets as potential partners the most popular teams based on the fan base, the trophy history, and also the openness of each league to develop innovative ideas.

4.5. Other Benefits that Blockchain Can Bring to Football Clubs

In this regard, from the Valencia CF side, it is considered that there are more benefits for the usage of blockchain and NFT from a football club beyond Fan Engagement. In this industry, this is a concept that nowadays everyone wants to tackle because it is known that top football clubs have huge fan bases on a global scale. The problem, stated Josep, is that these fan bases are not being capitalized, meaning that clubs are not generating as much money from it as they could. For example, a fan from the United States cannot come to Europe on a regular basis to follow all the games in the stadium, and in normal conditions, the freight costs associated with the purchase of an official jersey through an E-com platform, are beyond the willingness to pay of the average consumer. In this sense, blockchain platforms can bring the potential for football clubs to find new ways of generating more profit with this type of consumers. Moreover, Josep addressed the capability that blockchain has to tackle one of the biggest problems in clubs nowadays which is the non-existence of decentralized databases for operational information. When it comes to the process of sharing information in a club internally, the factors that characterize this technology would allow it to stay always in the club's database, preventing the issue of having a given professional leaving the institution and taking with him/her all the knowledge of a given field, jeopardizing the club's operations. In this regard, blockchain is considered to have the potential to have information belonging to the club, and not to individuals.

For the AC Milan side, Giorgia explained that for NFTs are not only about fan engagement. Of course, it is a huge part of the concept, but if a club works in a proper way, it can make the best economic benefits from platforms such a Socios.com. On the other hand, it was interesting to understand that there are external factors that can influence the revenues related to such a partnership. Sports performance, says Giorgia, is definitely at the top of this list. A such, it is considered important to develop new sources of revenue with this technology, but what is also a fact is that the club will never be fully able to control its revenues through these digital channels, as they are so dependable on the sports performance of the team.

As for BVB, Alexander stated that the club is already exploring further solutions that can be brought to it by blockchain. The interviewee started by explaining that the club already has an

international fan app that features some blockchain token mechanisms. This model is working as an experiment to see if such an application truly works in terms of sparking fan engagement. In this regard, the platform gives away fan tokens to the users who interact and browse in it the most. The possession of these tokens gives the user some benefits, but unlike Socios.com, they are not tradable.

This initiative represents an attempt to engage with the new generation of BVB fans which are mostly based overseas, that represents a profile distinct from the "heritage fans" that characterize the German market.

Alexander thinks that a blockchain-based mechanism has the potential to bring "stickiness" to a platform, mostly because it has a reward system. This international fan app has around 50,000 monthly users, a number that is likely to grow, but most of the users are highly active, meaning that they interact with the app's content quite often. As such, it is considered that this could be a hint that such a model could be a great tool to spark fan engagement.

Moreover, fan engagement is considered to be just one aspect of the potential of blockchain, since there are much bigger potential use cases for this technology. One example is ticketing. Alexander addressed the logic behind what RB Leipzig is doing in this field. The club has a complete blockchain-based ticketing system, and in order to purchase a ticket to any game happening in the Red Bull Arena (Leipzig stadium), every fan has to download the RB Leipzig app and buy the ticket inside that ecosystem. On one hand, a model based on "forcing" the people to use a technology they might not want to interact with can be considered as a downside. But on the other hand, a blockchain-based ticketing mechanism is highly attractive to football clubs because it gives them a very valuable tool to fight against the ticket black market that exists around the stadium during game days.

From a provider's side regarding the possibility for Sorare to bring other potential benefits to a football club through blockchain, Grégoire stated that today the most important for the company is to be focused on delivering well its current products, so developing new ones it's not the company's focus at the moment. Sorare is still a very small company with roughly 500,000 users on the planet, and these numbers need to increase on a global scale. Nevertheless, it is considered from the company's side that there's the potential for finding new ways for the usage of this technology with football clubs.

4.6. NFTs and Merchandising

Regarding the inclusion of NFTs in the operationalization of selling merchandising items, Josep considers that due to the complexity that it would add to the process, for Valencia this doesn't make sense at the moment.

For the ACM side, Giorgia considers that at the moment this is a really difficult question to answer, due to the complexity of the additional licensing agreements that the club would have to have with the NFT provider, in order to determine the number of royalties that the club could get back from issuing NFTs related to merchandising. As such, Giorgia does not think that the sales of the current merchandising items can be the best way to profit from a system based on blockchain and NFTs. Nevertheless, given the fact that collectibles are considered to be the best items to be associated with NFTs, maybe an autographed vintage jersey could be something from which a club could generate a different type of NFT. But the club doesn't think that the fans would be so into it at the moment. This is a market that is considered to still need to be explored in Europe.

On the BVB side, Alexander considers that this technology has the potential to bring merchandise to another level. The interviewee addressed the possibilities that can emerge through the now-on-trend metaverse and explained that traditional business models from the physical world can be transformed and adapted to this new digital reality. As an example, Alexander projected the future possibility of attending a Borussia Dortmund game virtually and owning an avatar that would wear virtual items that could be sold by the club.

Alexander also talked about the prospect of up-level any kind of physical merchandizing by selling an NFT as an addon. For example, having a fan buy a limited edition jersey in a store, and then get the same limited edition jersey in a video game.

Although interesting, these mechanisms aren't considered to be market-ready yet, and the big question mark relies on the acceptance that the user would apply to it. As with any innovation, it is not a given that traditional football fans would adopt this idea of digital merchandise.

As such, the three big pillars for blockchain solutions for football clubs are considered by Alexander to be fan engagement, ticketing solutions, and virtual ownership rights.

4.7. Main Challenges

Josep considers that the biggest challenge for the usage of blockchain from Valencia CF has to do with the fact that the people working in the club are not experts in blockchain, and has such there's a lot of disinformation around this topic that needs to be tackled internally in order to find new potential uses for this technology, that can bring benefits to the club. In this sense, Josep considers that one of the main challenges for Valencia's commercial department is to bring clarity regarding these topics to all the other departments of the club, to have them adapt to it. Josep considers that sports entities, in general, are really inflexible and resistant to change, because, with it, a lot of social and political questions pop up. This is something that is said to lead to a lot of risk aversion, which turns including new technologies in such an environment so challenging. Moreover, these facts are considered to be the reason why the implementation of blockchain in football clubs is happening in a slower way than in other industries.

When it comes to the main challenges for the practical use of NFTs from AC Milan, Giorgia says that the club is still at a stage that doesn't allow them to answer properly this question, since they are still trying to figure it out. As said above, important conclusions will be taken by the club at the end of the present season, and by that time ACM should possess concrete data that would help them understand better most of the factors that are related to this concept.

As for Borussia Dortmund, the first main challenge is considered to be related to the issues with the accessibility of the technology. This is a topic that must be improved because a football club with a massive reach, has to be able to leverage its reach and convert people onto the NFT marketplace to actually sell items.

The second challenge has to do with the acceptance of this concept from the club's stakeholders. Taking the example of a traditional football fan, it would be hard to convert a 60-year-old season ticket holder who is not familiar with cryptocurrencies, into a digital ecosystem user. Such an issue can also represent a challenge in the way that these initiatives can be communicated to the public, due to skepticism.

Finally, the last challenge at the present stage is to balance the topic of exclusivity with service providers. As the market is not settled yet, the risk for a club to choose the wrong provider is high. This can represent a big problem because if a club partners with a provider whose

blockchain solutions are weak, it will be stuck to this partnership for a certain period of time, which could mean spending all this time with a blockchain model that wouldn't be as appealing as it could to the fans.

From Sorare's side, the main challenge for a company of this nature is considered to be educating people on the concept of blockchain and NFTs, as well as the value that is intrinsic to them. In other words, to change the conception on which people are used to consuming football. In light of the difficulty of having a lot of people adopting this concept, Grégoire admitted that currently Sorare's entry price point for new consumers is quite expensive, and to turn this into a mass-market product there's the need to find ways to let more people in and enjoy the product.

In this regard, it is considered that today most of the persons that are introduced to NFTs are skeptical, because they don't understand the concept, and this is a barrier that is considered to be too high for Sorare. As such, the company is trying to find new ways to promote the game/platform and take advantage of the fact that they are the current market leaders, to bring more confidence to new people to join the platform.

According to Grégoire, Sorare's prospects for the future growth of this concept in the sports industry, are based on the development of the business by bringing more NFTs into its marketplace, and in this regard, the expansion to more sports other than football is being considered by the company. Moreover, the possibilities of following Dapper Labs' model and selling videos in the form of digital collectibles, together with the development of digital cards based on footballs or football jerseys, for instance, are also seen as future possibilities for Sorare, if the need for the development of such products would turn out to exist in the future.

6. Conclusions

This research aimed to identify the ways and reasons behind the usage of blockchain and NFTs by sports entities, with a special focus on professional football clubs. As such, its objectives consisted in highlight the different ways that this technology can be used by such institutions, the benefits it can bring, and understand possible prospects for its usage in the sports sector in a near future.

Concerning the first hypothesis (H1), the information collected from the interviews indicated that, indeed, blockchain and NFTs have the potential to become one of the main sources of revenue to football clubs in the future, and thus H1 can be confirmed. Considering the interviewed clubs perspective in this matter, it's possible to acknowledge that, even in an embryonic stage, the adoption of this technology already represents significant economic benefits, as NFT providers are already considered important partners to football clubs. Furthermore, given the fact that Sorare expects the growth of the digital collectibles market in the coming years, it is expected an increase in the user-base of this type of platforms, and with it an increase in the revenues that can be generated by football clubs. Such evidence is aligned with literature, in the sense that digital assets possess the potential to enhance the business of sports (Deloitte, 2021), and increase asset liquidity (Garcia-Teruel & Simón-Moreno, 2021). Moreover, it is predicted that in 2022, NFTs in the sports industry will generate values higher than $2 billion in transactions (Lee et al., 2021), and Sanka & Cheung (2021), also mention the expectations for the maturation and mainstream adoption of this technology by 2025.

When it comes to the second hypothesis (H2), the qualitative analysis conducted in this study gathered sufficient arguments to reject it. From the interviewed clubs perspective it is possible to gauge that there is much more to the usage of blockchain by football clubs, than fan engagement. Of course this is one of the big benefits from the adoption of this technology, but profit maximization, and operational data efficiency are two other major benefits that this technology has already proven to be able to bring to entities of this nature, aiming for the reduction of operational waste (Johnson, 2017). Moreover, the potential that blockchain and NFTs represent in terms of bringing further benefits to clubs is high, and this can be another indicator that there is more to this concept. This evidence illustrates Johnson (2017), in the sense that the benefits offered by blockchain open a lot of room for the development of many

potential products and applications, as well as the capability to deliver services and products that improve both the customer experience and the profitability of an enterprise.

Lastly, with respect to the third hypothesis (H3), the information collected from the interviews also allows its rejection. The findings of this research suggest different approaches to blockchain technology by all the three clubs interviewed, as well as different stages of adoption and inclusion of this concept in their business strategies. It was possible to gauge that the only transversal utilization of this technology by all the three clubs is the partnership with Sorare for the sale of digital collectibles.

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Appendices

Appendix A – Football clubs interview script

1. **How/when has (the club) started with NFTs? What's the logic behind the inclusion of this concept in the club's strategy?**

Key Takeaways:

Josep Borrel:

- First contact with the concept about one and a half years ago through Sorare, followed by partnerships with Socios.com, and Dapper Labs;
- One of the first clubs in Spain to adopt NFTs;
- Willingness to adapt to new technologies and to be seen as a versatile club;
- Blockchain as a way to maximize the capitalization of VCF's fan base, at a global scale.

Giorgia Buizza:

- Adoption of NFTs not included in a specific strategy;
- First contact with the concept through Socios.com, by the launch of ACM's exclusive NFTs and fan tokens ;
- ACM was one of the first clubs to join Socios' portfolio.

Alexander Mühl:

- No official club NFT activities beyond the partnership with some providers;
- The club considers this concept as a technological innovation with the potential to have a major impact in the sports industry;
- Doubts concerning how willing football fans will be to adopt this concept;

- BVB established as a priority the understanding of blockchain platforms' user experience, to understand if this technology is something that can truly be transferable to the sports industry.

2. **How is (the club) currently using NFTs, and what are the club's plans for the future with this concept?**
3.

Key Takeaways:

Josep Borrel:

- Current blockchain "star product" is the VCF Fan Token in Socios.com;
- VFC started by launching 1 million Fan Tokens in Socios.com, retailing for 2€ each;
- The sale of fan tokens represents significant economic benefits;
- Partnership with Sorare based on charging commissions for each digital asset sold in the company's marketplace;
- Through blockchain the club has the potential to profit not only from its fans, but from all the users of the platform.

Giorgia Buizza:

- Strategy based on giving fans a further reason for being fan token holders;
- Production of NFTs meant as assets to empowers the status of the fan token holders;
- Revenue share owed by Socios and ACM, for each new digital asset that is released;
- Future plans for this concept to be defined at the end of the current season, aiming for a deeper understanding of the impact of this technology in the sports sector.

Alexander Mühl:

- BVB is investigating the concept in a careful manner, to avoid the possibility of having speculators toying with the club's name in the future;
- The club wishes to start blockchain activities based on business models from the physical world that can be transferred to a digital reality, aiming to capture the interest of more consumers;
- Blockchain accessibility is key to BVB.

3. **What is the club trying to achieve through a partnership with a company like (partner)?**

Key Takeaways:

Josep Borrel:

- VCF aims to be seen as a disruptive and innovative football club from the outside, and is keen of finding new ways to differentiate itself from other football clubs.

Giorgia Buizza:

- For ACM blockchain can be seen as a kind of membership program;
- Club has the challenge to develop a blockchain-based product that proves to be interesting to the general ACM fan, and not only to crypto enthusiasts;
- Socios.com is already considered to be an important partner for the club;
- Success of the club's blockchain activity is highly reliable on the football team's results.

Alexander Mühl:

- Partnerships with both Sorare and Topps;
- BVB chose to partner-up with companies operating functional business models based on an already existing fan engagement mechanism – Sports cards collection;
- Borucratic matters related to club's image rights needed for the production of NFTs, are a constraint to football clubs who whish to produce exclusive digital assets on their own.

4. **A lot of blockchain platforms in the sports industry are related to Fan Engagement. Do you think that this is the greatest potential that blockchain technology can bring to a club, or can it represent much more in terms of benefits?**

Key Takeaways:

Josep Borrel:

- Blockchain can bring more benefits to football clubs, other than fan engagement;
- Blockchain technology can be a tool from which football clubs can find new ways to generate more profit from overseas consumers;
- This technology has the potential to tackle an issue existing in most professional football clubs – the non-existence of decentralized databases for operational information.

Giorgia Buizza:

- For ACM, blockchain is not only about fan engagement;
- If a club works in a proper way, it can take considerable profit from blockchain platforms.

Alexander Mühl:

- BVB is exploring this technology through an international fan app, based on blockchain token mechanisms, as an experiment;
- This platform has around 50,000 monthly users, and this numbers are likely to grow;
- It is considered that blockchain has the potential to bring "stickiness" to a platform, due to reward systems ;
- RB Leipzig blockchain-based ticketing system, is a good example of another benefit that this technology can bring to football clubs.

5. **One of the main sources of revenue of a club is Merchandising. Do you see any possible way on which (the club) could benefit from including Blockchain or NFTs in the process of selling merchandising items, like a football jersey, for instance?**

Key Takeaways:

Josep Borrel:

- The utilization of blockchain from VCF's side hasn't reached a stage to coop with the complexity implicit in this idea.

Giorgia Buizza:

- Difficult question to answer, due to the complexity of the additional licensing agreements needed to develop such conception;
- It is not considered that selling merchandising through an NFT based system would be the best way to take the most economic profit out of this technology;
- This is a market that still needs to be explored in Europe.

Alexander Mühl:

- This technology has the potential to bring merchandising to another level (metaverse);
- Although interesting, such mechanisms are not market-ready yet.

6. What are the main challenges for the practical use of NFTs by a Football Club?

Key Takeaways:

Josep Borrel:

- Disinformation around blockchain that needs to be tackled from the inside, for finding potential additional benefits to the club;
- Sports entities are inflexible in general, and this could be the explanation for the slower implementation of blockchain in the sports industry when compared to other sectors.

Giorgia Buizza:

- ACM is still at a stage of usage of this concept that doesn't allow the answer for this question in a reasoned way.

Alexander Mühl:

- The need of improving the accessibility of this technology, to leverage the club's massive reach;
- Communication challenge, aiming for the acceptance of this concept from traditional football fans;
- Balance the topic of exclusivity with service providers.

Appendix B – Sorare interview script

1. **What is Sorare, and how did it started as a company?**

   Key takeaways:

   Grégoire Mouton:

   - Sorare is digital marketplace for scarce digital card collectibles, that features fantasy football tournaments;
   - The concept was first launched in 2019, and it was generated following the success of NBA TOP in the US.

2. **What is the company's current business model?**

   Key takeaways:

   Grégoire Mouton:

   - Build partnerships with football leagues and clubs to buy individual property concerning the image rights of the football players, which allow the creation of licensed NFTs;
   - List the digital assets in its market place, and profit from taking commissions from each sale of a digital asset.

3. **Does Sorare has a selection criteria to choose its partners?**

   Key takeaways:

   Grégoire Mouton:

   - The club looks for partnerships with major football leagues and clubs, as a means of having the smaller teams following the bigger ones;
   - It is worth more to sign an entire league than one individual club at a time, when it comes to matters related with the image rights for the distribution of NFTs

4. **Are there any other potential benefits that Sorare can bring to football clubs through blockchain technology?**

   Key takeaways:

   Grégoire Mouton:

   - At this stage the company is focused on improving its current products, so developing new ones its not the current priority.

5. **What are the main challenges for the practical utilization of this technology, from an NFT provider's side?**

   Key takeaways:

   Grégoire Mouton:

   - Educating people about the concept of blockchain and NFTs, as well as the value that is intrinsic to these concepts;
   - People today that are introduced to NFTs are skeptic, because they don't understand the concept;
   - The company is trying to find new and more effective ways to promote the platform.

6. **What are Sorare's prospects for the growth of this concept in the sports industry in the coming years?**

   Key takeaways:

   Grégoire Mouton:

   - The company wants to develop the business by bringing more NFTs into the marketplace;
   - Considerations regarding the expansion to more sports other than football;
   - The possibilities of following Dapper Labs' model and sell videos in the form of digital collectibles, and the development of digital cards based o footballs or football jerseys, are also being considered

Appendix C – How to mint a NFT

Among the users of blockchain technology, there are a few specific terminologies to characterize some operations. In this regard, “to mint a NFT” is the terminology given to the process of turning digital artwork of any kind into exclusive digital assets.

Minting NFTs is a process, and in order to create and sell digital assets, there’s the need for an individual to follow a set of steps which will be described along with this document.

1. Setup of a crypto wallet

A crypto wallet is an indispensable tool to deal with any sort of transaction involving cryptocurrencies. It is a software program that allows an individual to store, send or receive any kind of crypto transaction (Nibley, 2021). The first step of this process consists in creating one.

2. Buy Ethereum

Due to the existence of some fees that are associated with the transformation of content into NFTs, there is the need to buy Ethereum to cover such costs, before being allowed to list digital tokens (Martin,2021).

3. Link the wallet to a Marketplace

Throughout the vast number of blockchain-based platforms that enable the sale of NFTs, OpenSea and Rarible are two of the most popular ones. To sell on any of these platforms, an individual must link his crypto wallet to them.

4. Upload the digital artwork into the platform

The next step is to upload the digital artwork intended to be turned into an NFT, in the blockchain-based platform chosen before. At this stage, the platform selected before should present to the user the option of either transforming the digital artwork into a single digital token or several.

5. List the NFT in the Marketplace

Finally, the last step consists in listing the brand new NFT, so buyers can find it in the Marketplace.