

How Genuino applies blockchain technology in the collectibles industry

Abstract

This chapter analyses the blockchain implemented by Genuino in the collectibles industry. Since collectibles are subject to high risk of counterfeiting and fake replications, blockchain technology can help substantially to ensure transparency, originality, ownership, and data security and protection. Two methods to use blockchain in the industry seem to be the most widespread today: creating digital native collectibles on blockchain, and transposing physical objects into the blockchain by creating digital twins. By using blockchain, new consumer clusters emerge, highlighting the need to modernize both the traditional economies and the current business models.

1. Introduction

The collectibles market has experienced an important modification with the e-commerce revolution, which moved the collectibles trade from shops to online platforms such as eBay (Heitner, 2016; Seideman, 2018). However, this shift implied a considerable increase of fakes. Among the technologies available to mitigate such risks, the blockchain technology is now emerging as a possible solution to these business issues. Among the full set of options and features, the blockchain enables firms to create non-fungible tokens, which turn out to be secure and unchangeable and whose uniqueness, originality, and ownership are guaranteed through the blockchain (Tapscott and Tapscott, 2016). Research has already documented the adoption of blockchain to mitigate the risks of counterfeiting items (Debayouty et al., 2021), which makes blockchain the ideal technology to solve this issue also for collectibles. In particular, two methods seem to be the most widespread today, whose application in the collectible and memorabilia industry is definitely feasible: 1) creating digital native collectibles on blockchain and 2) transposing physical objects into the blockchain by creating digital twins.

The option of creating digital native collectibles on blockchain has upfront advantages in the collectible and memorabilia industry. In fact, the blockchain protects related tokens, which are impossible to destroy, counterfeit, or replicate. Hence, users can engage in ownership and trade them easily (Rensing, 2021). Recently, Dapper Labs created and sold CryptoKitties, (<https://www.dapperlabs.com>), which are fully digital and unique carton cats. Only two months after their launch in 2018, Dapper Labs managed to generate a turnover close to \$20 million (Zorloni, 2018). Given the great success with the CryptoKitties, Dapper Labs then turned to sports

collectibles by creating the NBA Top Shots in collaboration with the NBA (Browne, 2021). NBA Top Shots invented a new category of collectibles: the key moments of NBA games. Through this type of collectible, consumers can buy videos of key moments of a certain match and become exclusive owners (Guzman, 2021). The business model linked to NBA Top Shots created a turnover of \$50 million in the first 30 days (Guzman, 2021). After purchase, moments can be traded between fans. For example, a key moment in a match with LeBron James has been sold for \$208,000 (Browne, 2021). Alternative approaches consist of digital collectible cards, which have the same functionalities of the physical ones. Anyways, there are several applications suitable for these options. Dapper Lab created tokens for Mixed Martial Arts MMA (Roberts, 2020), Sorare (<https://sorare.com>), and Fantastec Swap (<https://www.swap-fantastec.com>). Player Tokens Inc., turned to baseball (<https://playertokens.co>), while Animoca Brands (<https://www.animocabrands.com>) entered the world of Moto GP and Formula 1 (Schmidt, 2020). Finally, some companies embrace more sports simultaneously, such as Ex Sport (<https://www.ex-sports.io>).

A different, more complex approach to tokenization consists of bringing physical sports collectibles into the digital world through blockchain technology. The physical object “transposition” involves creating a digital twin in the blockchain. Fantastec Swap (<https://www.fantastec.io/#home>) uses a hybrid approach by both creating full digital collectibles and turning some physical objects into digital ones. A typical example of such applications are autographs. The Fantastec Swap’s partners are some top international soccer clubs such as Real Madrid, Borussia Dortmund, and Arsenal. These partnerships provide an example of the economic value of following the business model. A similar approach has been taken by Collectable.com (<https://collectable.com>), who searches for high-value sports collectibles, verifies their authenticity, and makes sure that they are conserved in the best possible way. The physical collectibles are then held by Collectable.com, which creates a Digital Twin on the blockchain. Collectable.com customers can then purchase the digital twin entirely or in fractions thereof and hold them in their portfolio. In the Collectable.com marketplace, consumers can trade with collectibles and create a secondary market that works similarly to the stock market.

Along with the aforementioned wave, new approaches to digitalization are emerging in the collectibles industry. Among those, Genuino has certainly taken a different and original approach to manage collectibles (<https://genuino.world/page.html>). The Genuino's final goal is to combat counterfeiting in the sports collectibles market while allowing enthusiasts to hold physical and digital objects and exchange freely. Genuino’s idea is to digitalize collectibles by applying t-shirt patches that collect information on sport events. Examples of information are the athlete’s name,

whether he played a game, the performance, the amount of time he played, and its roles. The patch receives information and signals from physical oracles, located throughout the playing field and integrated within all sport facilities. The collected information is then recorded to the blockchain, becoming then trustable, traceable, valuable, and original. Considering the different approach adopted by Genuino, we will go through the full case to highlight how the blockchain is used, the possible advantages linked, as well as the emerging threats.

The chapter is organized as follows. Section 2 provides an overview of the collectibles industry to highlight its importance, while Section 3 describes the idea behind Genuino's solution. Section 4 introduces the certification process, while Section 5 explains the integration of blockchain with other technologies. Section 6 discusses the case, and Section 7 analyzes emerging threats and opportunities. Finally, Section 8 briefly concludes and identifies the future research directions to be undertaken.

2. An overview of the collectibles industry

The collectibles market is a growing industry worth around \$370 billion a year (Heitner, 2016; Ito, 2020). People buy collectibles for several motivations: pure passion, affirmation of a social status, social consensus, philanthropy, and speculative investment (Bleve et al., 2018). Collectables are often assimilated into real luxury goods that reflect the owners' passion and lifestyle (Hechler-Fayd'herbe and Picinati di Torcello, 2020). According to a survey conducted by the Credit Suisse, more than 70% of customers are collectors and buy collectibles most likely to cultivate their passions. Furthermore, collectibles have recently gained great popularity as a form of investment, which can diversify one's portfolio (Bleve et al., 2018; Kiesnoski, 2019). This finding is especially true for ultra-high-net-worth individuals, as collectibles count between 5% and 10% (with peaks of 15%) of the total amount invested (Hechler-Fayd'herbe and Picinati di Torcello, 2020). These percentages are in line with other consulting and professional advice and reports (Kiesnoski, 2019). Although investments on collectives are currently increasing in the range \$250 and \$5000 (Hechler-Fayd'herbe and Picinati di Torcello, 2020), Deloitte highlights that the attention for collectibles depends on its low correlation with traditional assets (Bleve et al., 2018), which is a proxy of a diversified portfolio.

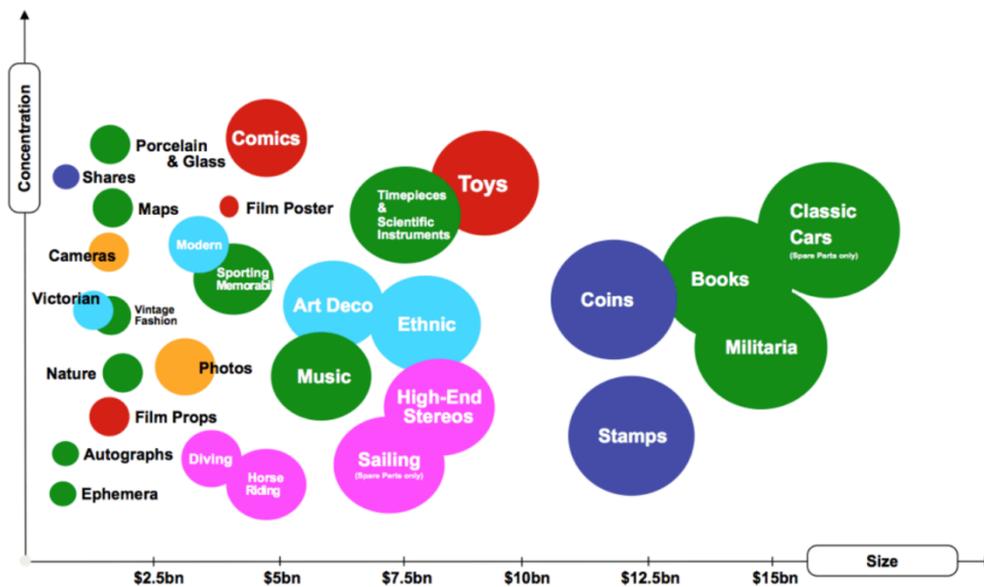


Figure 1: Collectibles category (source: Ito, 2020)

Figure 1 (Ito, 2020) shows the most common categories of collectibles classified by size and concentration. The latter consists of the number of items included in each category and their impact on the within-category sales. The colors identify clusters of goods. The size of the bubbles indicates the category's global trade volume. Accordingly, art, classic cars, wine, coins, stamps, and sports memorabilia are the most prominent collectibles. In this chapter, we focus on the sports memorabilia market, since it offers numerous opportunities to apply the blockchain technology given its size and growth (Seideman, 2018). In fact, millennials and members of Generation Z, who have the financial means to enjoy collections, are often willing to collect this type of objects (Weil, 2019). Sports memorabilia represents a fundamental segment of the collectibles market, involving 67 million people a year (Heitner, 2016) and about \$10 billion globally, with approximately half from the United States (Seideman, 2018). Jerseys used by sports superstars can often be valued at hundreds of thousands of dollars (Weil, 2019). In June 2019, Babe Ruth's New York Yankees jersey from 1928-1930 has been sold at auction for \$5.64 million, making it the most expensive sports memorabilia item ever sold (Weil, 2019). The most popular items are those that belonged to the 6-time NBA champion and superstar Michael Jordan (Heitner, 2016), whose popularity is constantly growing thanks through the recent ESPN docuseries, "The Last Dance" (Red, 2020). The jersey wore by Jordan during the farewell match with the Chicago Bulls was auctioned for \$173,000 (Heitner, 2016).

The high risk of fraud and counterfeiting is one of the most recurrent problems within the sports memorabilia market (Red, 2020). In the past, William Mastro, also called “The King of Memorabilia” and owner of Mastro Auction (Crosby, 2015), was accused and later sentenced to 20 months in jail for defrauding his clients; he tampered with sports memorabilia and sold fake items for more than 7 years (Crosby, 2015). However, Mastro’s case is not isolated. The "Bullpen" investigation conducted by the FBI starting in the 1990s reveals that about 50% of sports memorabilia sold in the United States are counterfeit, while certain items present a counterfeit rate of up to 90% (The Federal Bureau of Investigation, 2005). These estimates make the sports memorabilia market very risky and uncertain, as confirmed by the United States Postal Inspection Service (2019).

The most important threats persisting in the sports memorabilia market relate to the difficulty to verify an object’s originality, the peculiar skills requested and the high experience needed to verify the originality, and the exchange system regulating the objects’ transactions (Weil, 2019; Thomas, 2020; Red, 2020). To date, collective objects are exchanged between fans and collectors either through independent auctions or generalist websites such as eBay (Seideman, 2018). According to Pownall (2017), private sales mobilize 70% of the total value of sports memorabilia market, whose transactions are most likely finalized online, without any face-to-face meeting, through payments that are not guaranteed, and with uncertain shipment to the buyer's location. Therefore, the buyer is unable to verify the originality of a collectible object before receiving it physically. Hence, buyers have insufficient operational tools against possible scams, while they can look at the price as a proxy that signals the items’ originality. In fact, a price outside the market price – either above or below – could warn buyers of possible scams (Weil, 2019; Thomas, 2020). Alternatively, buyers can collect information about the sellers, verifying features like their presence in the market or their reliability in past transactions (Weil, 2019). Items can also be either certified and authenticated by professional organizations like the Professional Sports Authenticator JSA and Beckett or purchased from these sources (Red, 2020). However, several issues remain, like the cost and timing for the authentication procedure as well as the risk of false certificates and certifiers’ mistakes (Thomas, 2020).

3. The Genuino case study

Genuino is an innovative startup within the ICT sector, funded in the USA in 2018 and established in Italy on February 1, 2019. Genuino is a decentralized protocol to certify, authenticate, and trade digital collectibles backed by certified physical assets, which integrates blockchain, IoT, and Artificial Intelligence technologies into a proprietary web app and mobile app (Genuino, 2020). By

combining all of these technologies, Genuino connects both the digital and physical worlds. The company's motto is: "Collect Digital. Own Physical". The idea for this application comes from the awareness that we live in an era of post truth, in which it is difficult to blindly trust regarding product genuineness based only on the sellers' communication and advertising. Genuino knows that the new primary consumers' needs are to verify a product first hand and to gain understanding and gather evidence on a product. Companies should adapt to this need and inspire the trust of consumers, creating transparency relative to a product and along the whole supply chain. The certification protocol that Genuino has created meets these needs; the system collects data within the production processes while minimizing the risk of manipulation and increasing the product's authenticity. Genuino's mission is to enhance quality and guarantee the traceability, sustainability, and anti-counterfeiting of the product, thereby safeguarding the final consumer, the product manufacturer, and all stakeholders. Although Genuino knows the potential of its blockchain approach, today, it tests and applies its solution to the food sector by exploiting a partnership with Daruma sushi, as well as in the sports collectibles thanks to the partnership with ACF Fiorentina. The latter represents the main sector of Genuino's business today and in the near future. Genuino seeks to create a solution against counterfeiting and to empower brands. These dual targets will allow them to tell their stories and engage their fans through NFTs connected to physical certified assets. To this end, Genuino's solution must achieve three primary objectives: guarantee the authenticity of a jersey and distinguish between "Match Worn" or "Match Prepared", trace the constituent elements of the shirt, and trace the creation and transfer of ownership events.

Genuino was created in 2018 based on the ideas of Gabriele Bernasconi and Eleonora Mulas, two Italians abroad with the desire to bring a little Italianism out of their country of origin. To do this, they first turned their attention to the food sector, for which Italy is recognized all over the world, trying to certify the quality of products with the blockchain. However, they quickly realized that this was probably not the best sector, especially because of the scale-up issues linked to the blockchain technology (De Giovanni, 2020). In contrast, people within the sports sector are much more willing to adopt new technologies, and that has allowed for greater and faster mass adoption. In February 2019, Genuino was founded as a company in Italy and, after acquiring further skills and capital, Genuino developed the first prototype of blockchain technology with ACF Fiorentina. The prototype has been tested in the last two rounds of the Serie A 2019/2020 championship: Fiorentina-Roma and Fiorentina-Inter. Meanwhile, Genuino was selected to participate in the CES in Las Vegas, one of the largest events in this sector in the world. The project with ACF Fiorentina soon evolved and moved from just the certification of the jerseys to the creation of a marketplace with a series of digital collectibles to engage with their fans. The product

will be launched in July 2021 for the start of the new sporting season and will include both physical and digital collectibles.

4. Genuino's certification process

Through the certification process, Genuino seeks to guarantee the authenticity of jerseys worn by players during official matches. In fact, especially when objects have high economic value, a high counterfeiting rate exists (De Giovanni, 2019). This is a demanding challenge, since the protocol developed must guarantee the certification of the object on the blockchain with the use of all required technologies and without interfering with the usual activities of staff and athletes before, during, and after the match. Although Genuino's prototype has been created for football games, it can be easily applied to other sports. Each football jersey is created from a virgin anonymous jersey plus a set of patches that can be applied via a thermal press. The jerseys prepared for an event become two types: *match worn* or *match prepared*. Match-worn jerseys are the jerseys worn and that actually entered the field during the game phase. Two shirts enter the field (one during the first half and one for the second half). One is left to the football team for sale, and the other remains available to the player who wore it. Match-prepared jerseys are prepared and/or worn jerseys that have not actively participated in the match. Match-prepared jerseys can be used at a later event if they have not been stressed. For each match played, the following are prepared: two shirts for each player, two shirts per goalkeeper in three possible colors, and about ten neutral jerseys to customize during the moment in case of need.

To ensure the achievement of the certification objectives, each jersey must be uniquely identified both in the physical and digital settings. For this reason, a smart patch containing identification passive tags are added to each shirt. A Non-Fungible Token (NFT) will also be created on the blockchain for each jersey. The smart patch is the connection between the physical object to the digital one. A gate records the passage of the jersey once the player enters and exits from the pitch. All recorded data is directly registered on the blockchain without third-party intermediation. Once this background process has been completed, it will be possible to sell the shirts and tokens that represent them digitally. The jerseys can be purchased and exchanged through the Genuino Marketplace.

How can buyers verify the originality of a jersey? The verification of the authenticity of the jersey can be performed using the Genuino app, upon framing the patch. The transfer of jersey ownership takes place in two steps, a physical transfer and a digital one. Once the buyer has transferred the agreed-upon fee, the seller transfers the jersey as a physical object and the digital NFT token representing the certificate of shirt ownership to the buyer. The NFT token transfer takes

place like a normal wallet transaction as the NFT token is transferred from one wallet to another, once the jersey authenticity is validated by the buyers through the Genuino app.

5. Blockchain and other technologies

Within the certification protocol described above, blockchain and non-blockchain technologies are applied. Given the positioning of Genuino's "Collect Physical. Own Digital" mission, blockchain technology alone is not enough to guarantee an object's originality. Other technologies are needed to connect the physical object with the virtual token created on the blockchain (De Giovanni, 2021). In fact, the transition from physical to virtual is one of the most delicate phases in the certification process on the blockchain, since it is the easiest step to counterfeit. In this section, we will determine the fundamental technologies used by Genuino in this phase. In particular, we will see how the blockchain, NFTs, and patches work altogether.

One of the fundamental choices that Genuino made was the selection of the blockchain to use when registering the NFTs linked to the physical object and based on which the transactions take place. Initially, Genuino's choice was Ethereum, which is particularly effective and suitable for operations of this type. Ethereum is one of the most important public blockchains and guarantees the solidity and reliability of the recorded information. Furthermore, Ethereum creates NFTs called ERC 721, which lend themselves to this type of use. However, due to the increase in the cost of gas, Genuino had to revise its choice. Gas refers to the amount of money required by miners to perform operations such as transactions and smart contracts on Ethereum (Kay, 2021). The amount of gas required is not the same for each operation but depends on the speed with which you want the operation to be completed, the complexity of the operation, and the number of pending transactions in the network (Kay, 2021). With the outbreak of Decentralized Finance in the summer of 2020, the number of complex transactions in Ethereum increased considerably, leading to network congestion (Haig, 2021). This has resulted in average transaction fees exceeding \$20 per transaction (Foxley, 2021). In a traceability protocol like that of Genuino, in which it is important to write every relevant event on the blockchain, the cost to write the information on the blockchain would have been prohibitive. So, Genuino had to review the choice and rely on L2 EVM. The two main advantages of using L2 for the application of Genuino are that it allows one to perform transactions with a very low commission in gas (e.g., up to 500 transactions can be made for few cent of a dollar), and it allows one to create a block and, therefore, to record the information very quickly. Furthermore, as an Ethereum side chain, it "bridges" with Ethereum and accommodates any request to transfer the tokens to Ethereum.



Figure 2. Example of Genuino's patch

NFTs are created on the L2 blockchain. "Non-fungible tokens are unique, digital items with blockchain-managed ownership" (Finzer, 2020). Non-fungible goods are all objects that are not interchangeable, in contrast to fungible goods, such as money, which are perfectly interchangeable. It makes no difference whether a person has one 10€ banknote or another, because the banknotes have exactly the same value. Thanks to the blockchain, it is possible to assign the ownership of these objects to subjects who can hold them in their wallets and manage them as they like. NFTs can move across different ecosystems and across different Blockchains (Finzer, 2020). Another interesting feature of NFTs is that they can be traded and sold, and the high speed with which this can take place gives them high liquidity (Wintermeyer, 2021). Examples of NFTs include collectibles, game items, digital art, event tickets, domain names, and even ownership records for physical assets (Finzer, 2020).

NFTs are tools used by Genuino to represent physical shirts in the virtual world, functioning as real certificates of ownership of the jersey. The connection between the physical shirt and the digital NFT takes place through a smart patch applied to the shirts and the stadium gate. Patches are applied to the game jerseys. Using the patches, Genuino customizes a virgin jersey with the sponsors, the players' names, and information about the competition during which the jersey was used. In the world of football, the patches applied to the jerseys are produced by a single supplier and made of different materials. There are two main patch packages: front patches, which represent sponsors and other ancillary info, and back patches, which indicate the player's name and jersey number. To recognize the t-shirts on the Genuino's blockchain, an additional small patch is applied to each t-shirt (Figure 4) without disturbing the operations or the activities linked to the game preparation, including the game jerseys. The patches are applied once to the blank jerseys, and their preparation process varies only marginally, considering the different types of patches. This new smart patch was developed by Genuino in partnership with DekoGrapics, one of the world leaders in the sector. The challenges that characterized the research and development phase were mainly due to the sensor durability embedded in the patch. In fact, the sensors are subjected to stresses when applied to the t-shirt as well as during the washing phase.

6. Case discussion

Genuino's solution creates benefits for both firms and consumers (Table 1). On the one hand, firms mitigate the counterfeiting issues by attaching a digital ownership certificate to their physical objects. This allows them to improve the brand value by protecting imitations and increasing transparency. On the other hand, consumers can quickly and effectively verify and validate the product by having proof of originality and ownership in just a few seconds. Using Genuino, consumers can see the jersey's chain of ownership by tracing the object life and the full batch of information connected to it. Furthermore, consumers can access an efficient and secure platform to sell and exchange the jersey in future transactions. In this sense, it is worth mentioning that Genuino opens the sports collectibles market to three types of people: collectors, fans, and crypto enthusiasts. The first category includes the classic collectors of collectibles and memorabilia. These people collect objects independent of the blockchain; however, they can easily and safely exchange objects through Genuino. Furthermore, the fans and supporters teams are generally discouraged from purchasing sports collectibles due to their low purchasing skills. Genuino supports them by simplifying the purchasing process and involving them in the new market platform.

Finally, crypto enthusiasts are more familiar with the blockchain world than with sports sector. This category is well informed on the crypto world dynamics, and are mainly interested in investment and speculative opportunities. crypto enthusiasts know the success of CryptoPunk and CryptoKitties, whose digital collectible NFTs value increased exponentially in a few months. Therefore, they can invest in sports collectibles and their respective NFTs hoping to follow the same path.

The Genuino solution raises some concerns when connecting physical and digital worlds and the related processes, which can take place both on and off the chain. Although the data is recorded on the blockchain, thus making it unchangeable and guaranteed, the insertion phase offers opportunities for falsification. Therefore, the data entry process is the weakest and most complex task in most applications. Genuino has invested massively to limit these issues, especially when the process takes place off chain or outside the blockchain. Genuino's motto is "Collect Digital. Own Physical." Therefore, unlike the full digital collectibles, it is impossible to manage all tasks on chain. Off-chain steps are required for physical objects, specifically jerseys. To ensure their correct identification and prevent illegal actions like the use of stolen tags or cloning of serial numbers, the NFT token is generated when the owner establishes the association between the patch and the product. From this point, the falsification opportunities are extremely limited, since all data is recorded by the sensors (physical oracles) and without any human intervention. When the jersey worn by the player enters or leaves the field, the sensors capture this information and record it on

the blockchain. Overall, Genuino achieves the target of limiting falsifications during the phases of data collection and record on the blockchain using IoT sensors.

7. Emerging treats and opportunities through blockchain

Despite the numerous advantages that Genuino brings to customers using the blockchain, this solution is highly challenging. Among the challenges faced, we previously mentioned the development of identification tags to be embedded into the jersey, subject to many stresses like pressure, temperature, and body fluids. In addition to this issue, we identified three further challenges: the patch sensors can be either damaged or broken, legal issues can arise, and the possible pricing bubble linked to NFTs (Table 1). The smart patch and its sensors are the link between the virtual NFT and the jersey. The sensors associate a jersey with the NFT on the blockchain. There is a rare possibility that the sensors are broken. In fact, collectors are used to conserve and prevent match-worn jerseys from being worn or washed and, therefore, preserve the whole market value. To avoid this risk, Genuino carried out various stress tests on the patches to ensure their resistance through the use of several machine washes. The patches have shown good resistance in combinations of various situation. However, for any poorly performing patch, Genuino has developed a procedure for a prompt replacement that involves checking the actual sensor breakage from the back end. The damaged jersey is then sent to Genuino, the damaged patch is replaced, and a new NFT is created and associated with the new patch. To preserve all of the information recorded in the NFT connected to the broken patch, Genuino transfers the entire batch of information to the new NFT, preserving the whole history of the shirt, and ensuring total transparency to the customer. Another challenge that Genuino faces concerns the legal aspects linked to anti money laundering (AML) with the related issue of Knowing Your Customer (KYC) as well as the privacy issues. The KYC falls under the AML legislation, including the KYC law that provides obligations for the charged parties. Usually, the subjects charged are qualified subjects such as lawyers, notaries, accountants, banks, and financial institutions. These institutes are used to identify (either manually or automatically) the clients who contact them for any service by crossing data linked to difference sources. While this legislation only applied to the charged parties till the cryptocurrencies have been introduced in the business world to manage transactions and mimic the behavior of traditional currencies. Tokens linked to blockchain (such as NFTs) can be added to cryptocurrencies, considering that the NFT is not a currency in itself. However, it can be linked to a shirt, a painting, a video, etc. Selling the NFT does not signify selling a currency; instead, it implies selling an object, thus signaling that the NFT has value and is very often used in a speculative way similar to cryptocurrencies.

This paradigm has created confusion among Italian and European regulators, who consider all crypto-assets as a sector with high potential risk of money laundering. Therefore, they have created a new category of subjects charged with carrying out crypto activities. The Italian legislative Decree 231/2007 and the fifth European AML directive of 2019 identify new subjects charged. Legislative Decree 231/2007, Article 1 letter FF identifies the following as charged subjects: *"Service providers relating to the use of virtual currency: any natural or legal person who provides third parties, on a professional basis, even online, with functional services use, exchange, storage of virtual currency and their conversion [...] as well as issuing, offering, transfer and clearing services and any other service functional to the acquisition, negotiation or intermediation in the exchange of the same currencies; ff-bis) digital wallet service providers [...]."* Genuino falls into these categories, both for receiving and guarding digital currency and converting them into further digital value representations such as Genuino's NFTs. Therefore, Genuino must perform these tasks to avoid legal problems.

The procedure that Genuino put in place includes customer identification with first name, surname, date of birth, identity card, and photo. Then, it must keep this data secure and report to the authorities any suspicious transactions that exceed certain amounts and/or that can be considered anomalous by law. Much software has been developed that pursues these targets along with data collection and reporting. Genuino acquires the data and fulfills these obligations only for customers who purchase NFTs and carry out transactions to prevent the KYC.

The second legal issue emerging through Genuino's blockchain is the potential compromise of privacy. In Europe, the General Data Protection Regulation (GDPR) 679/2016 became fully applicable in all European countries in 2018. Since 2018, all European countries are obliged to comply with the GDPR regulation, which also applies to companies with registered offices outside the European Union any time European Union citizens are involved. When Genuino acquires users' personal data, it must comply with this regulation. Genuino possesses sensitive data related to consumers, knows how many NFTs a person has, and knows that each person could have an NFT worth millions of euros. Therefore, Genuino could have information impacting individuals' freedom and rights. Genuino pays particular attention to privacy, not only surrounding the possible legal burdens, but also because it will play a key competitive role in the future. In fact, customers are increasingly careful of how their data is processed by firms, especially in the crypto world.

The measures adopted by Genuino to mitigate the privacy issues must be analyzed on both technical and formal levels. From a technical point of view, Genuino adopts all available technologies such as server partitioning, encryption, and backups. From a formal point of view, it

identifies an extremely restricted list of employees and managers who have the credentials to access the data.

The last weakness of Genuino's solution lies in the possible bubble of NFTs. Indeed, while NFTs supporters believe that NFTs are the future of collectibles and the digital economy, a growing number of people believe that NFTs could create a bubble that eventually will burst (Wintermeyer, 2021). NFTs linked to collectibles or arts experience a constant increasing value and are traded at important speculative prices. One example is the NFT of a digital art by Beeple, one of the greatest digital artists, sold in March 2021 for nearly \$70 million (Reyburn, 2021). As a result, the vast majority of buyers buy NFTs to speculate on and earn from a future sale (Turley, 2021). It is extremely difficult to assess the evolution of the NFT market, since there are countless factors that influence it, such as the interest of speculative investors, gas prices (in particular on Ethereum), and the possible emergence of dedicated blockchains focused on NFT (Wintermeyer, 2021). Therefore, Genuino must operate within this changing and highly unstable context. The main risk for Genuino's users could be the drastic reduction in their value when increasing the NFTs available. Then, no one would buy NFTs, which will become illiquid. For this reason, Genuino is now working on a solution based on decentralized finance systems to ensure that its NFTs maintain a certain liquidity in any situation.

On the positive side, Genuino uses blockchain technology to develop its idea and business strategy. It will launch its product on the market in July 2021 with the kickoff of the Serie A 2021/2022 season in partnership with some Serie A teams including ACF Fiorentina. Genuino is also working on further developments of its product in addition to the certification process. The most important of those is the marketplace for the exchange of NFT tokens and physical t-shirts and for the sale of full digital collectibles. Consistent with Genuino's motto of "Collect Digital, Own Physical", the marketplace includes three main phases with the aim of tradability and fan engagement. The first phase is called "Collect Digital". In this phase, it is possible to collect digital objects that consumers can obtain by participating in drops or by purchasing virtual packages of collectibles. The second phase is called "Own Physical". In this phase, collectors must complete challenges and missions when collecting digital NFTs. Upon completion of these missions, they will receive the physical object as a reward. These first two phases are aimed primarily at collectors and fans, while the third phase is aimed at all three categories of Genuino customers. The third stage is called "Unleash Defi". This phase, combining the Genuino token with a decentralized finance system, allows the creation of value through farming and staking. Moreover, these dynamics ensure the NFT liquidity in case no one wants to buy the item.

Opportunities	Treats
Mitigate the counterfeiting issues	Data entry process into the blockchain could be an opportunity for falsification
Improve the brand value	Patch sensors can be damaged or broken
Quickly and effectively verify and validate the product	Legal issues: anti money laundering (AML) and Know Your Customer (KYC)
Marketplace	Legal issues: Privacy
Opens the sports collectibles market to three types of people: collectors, fans, and crypto enthusiasts	Possible pricing bubble linked to NFTs and possible token liquidity issue

Table 1: Treats and opportunities of blockchain applied in the collectible industry

8. Conclusions

This chapter analyzed the case of Genuino, which applied the blockchain technology to the sport collectibles to extract the value behind the industry objects and connect these physical objects with a digital platform through the blockchain. The presence of blockchain in the Genuino's business activates three consumers' categories, specifically collectors, fans, and crypto enthusiasts. Each has different motivations for accessing the blockchain solution, which is fully managed through NFTs linked to physical objects.

The blockchain uses physical oracles, most likely IoT linked to patches to collect information during sports events and to register everything in the blockchain to increase the collectibles' values. This method of recording information offers advantages in terms of mitigating counterfeiting issues; providing proof of the collectibles' originality; provide incorruptible details regarding the event, the player, and the collectibles; and ensure that the items registered on the blockchain platform can be exchanged within the Genuino's platform in a secure and authorized environment.

Although the business model is quite promising, Genuino still has some challenges to face. From the operational side, the patches' conformance and durability can create some issues throughout the entire process. Since several types of agreements exist in traditional partnerships (Preeker and De Giovanni, 2018), Genuino could bring the partnership with DekoGraphics to a higher level, integrating the contractual agreements within the blockchain as well. Furthermore, legal issues must still be understood and governed. Being a completely new business model and a different environment, the exchanges and the rules being part of the entire set of transactions must be rethought and reengineered dynamically. In this sense, Genuino must still solve the issue of

money laundering, since the NFTs are not cryptocurrencies to be exchanged in the stock market, but they carry out economic value as they were cryptocurrencies. This kind of situation can create resistances from consumers who are not familiar with such types of applications as well as from regulators and legislation that need integration in comparison to traditional transactions. Finally, Genuino needs to set a plan of investments and strategic actions to guarantee the stakeholder's privacy at large. In fact, stakeholders should provide and exchange confidential information, which can be subject to cyber warfare and cyber espionage over time. The challenge is to guarantee confidentiality through ad hoc and updated protection systems.

The experience of Genuino's blockchain will facilitate research in future directions. First, the existence of new consumer clusters inspires research on strategic consumers who adjust their purchasing behavior according to the market conditions and opportunities. Within the Genuino framework, the NFT value and market perception can modify the purchasing attitudes of collectors, fans, and crypto enthusiasts. Second, future research should analyze how the formation of the collectibles' price changes according to the teams' performance and, consequently, the convenience of adopting blockchain technologies. Third, Genuino can evaluate the possibility to acquire knowledge regarding making the patches, with the objective of mitigating any operational issues emerging from suppliers. Finally, the current blockchain technology created by Genuino links most likely to physical oracles located all over the playing field. Additional oracles as well as other digital technologies can be generally adopted to increase the object originality and value (De Giovanni and Cariola, 2020). For example, human oracles could be linked to the fans' tickets. Important moments in a match are then collected by the IoT system, and the information is exchanged with the human oracles. The fans receive tokens for any verified information, which is then transferred and recorded to the blockchain when the human oracle consensus is reached. Other types of oracles to be adopted are software oracles as well as inbound and outbound oracles.

References

- Bleve, D., Costa, M., Ghilardi, R., Lanzillo, E., Picinati di Torcello, A., Ripa, P., Tagliaferri, B., et al. (2018), *Il Mercato Dell'arte e Dei Beni Da Collezione Report 2018*, Italia.
- Browne, R. (2021), "Crypto collectibles are selling for thousands — and celebrities like Mark Cuban are cashing in", *CNBC*, pp. 1–20.
- Crosby, R. (2015), "King of Memorabilia sentenced to 20 months in prison for fraud", *Chicago*

Tribune, pp. 1–7.

- De Giovanni, P. (2019). Digital supply chain through dynamic inventory and smart contracts. *Mathematics*, 7(12), 1235.
- De Giovanni, P. (2020). Blockchain and smart contracts in supply chain management: A game theoretic model. *International Journal of Production Economics*, 228, 107855.
- De Giovanni, P. (2021). Dynamic Quality Models and Games in Digital Supply Chains: *How Digital Transformation Impacts Supply Chain Quality Management*. Springer Nature.
- De Giovanni, P., & Cariola, A. (2020). Process innovation through industry 4.0 technologies, lean practices and green supply chains. *Research in Transportation Economics*, 100869.
- Finzer, D. (2020), *The Non-Fungible Token Bible: Everything You Need to Know about NFTs*, available at: [https://opensea.io/blog/guides/non-fungible-tokens/#:~:text=Non-fungible tokens \(NFTs\),ownership records for physical assets](https://opensea.io/blog/guides/non-fungible-tokens/#:~:text=Non-fungible tokens (NFTs),ownership records for physical assets).
- Foxley, W. (2021), “Ethereum Transaction Fees Hit Record Highs as Ether , DeFi Coins Soar”, *Yahoo Finance*.
- Genuino. (2020), “Genuino About us”, available at: <https://genuino.world/page.html> (accessed 4 January 2021).
- Guzman, Z. (2021), “This blockchain startup selling collectible NBA highlights just had \$50 million in sales in 30 days”, *Yahoo!Finance*, pp. 1–7.
- Haig, S. (2021), “Ethereum posts new highs as DeFi gas fees go through the roof”, *Cointelegraph*.
- Hechler-Fayd’herbe, N. and Picinati di Torcello, A. (2020), *Collectibles: An Integral Part of Wealth*, Luxembourg.
- Heitner, D. (2016), “Playing Ball In The Multi-Billion Dollar Sports Collectible Market”, *Forbes*, pp. 2–7.
- Ito, R. (2020), “The future of collectibles is digital”, *Tech Crunch*, available at: <https://techcrunch.com/2020/03/25/the-future-of-collectibles-is-digital/> (accessed 26 February 2021).
- Kay, G. (2021), “Selling crypto art can come with huge hidden fees, leading some people to lose hundreds of dollars”, *Business Insider*.
- Kiesnoski, K. (2019), “Are collectibles for collecting or investing? Advisors weigh in”, *CNBC.Com*, June, available at: <https://www.cnbc.com/2019/06/21/are-collectibles-for-collecting-or-investing-advisors-weigh-in.html>.
- Pownall, R. (2017), *TEFAF Art Market Report 2017*, The European Fine Art Foundation (Tefaf), Helvoirt, available at: www.ideebv.com.
- Preeker, T., & De Giovanni, P. (2018). *Coordinating innovation projects with high tech suppliers*

- through contracts*. *Research Policy*, 47(6), 1161-1172.
- Red, C. (2020), "Sports Memorabilia Is Booming , But Industry Has Its Share Of Past Scandal", *Forbes*, pp. 1–6.
- Rensing, L. (2021), "The future of sports is embracing digitisation", *SportsPro*, pp. 1–7.
- Reyburn, S. (2021), "Art's NFT Question: Next Frontier in Trading, or a New Form of Tulip?", *The New York Times*, New York, March, pp. 3–7.
- Roberts, J.J. (2020), "UFC and Dapper Labs offer crypto collectibles of MMA fighters", *Fortune*, pp. 21–25.
- Schmidt, S.L. (2020), *21st Century Sports: How Technologies Will Change Sports in the Digital Age*, Springer Nature, Dusseldorf.
- Seideman, D. (2018), "Tech Entrepreneur Determines First Estimate Of U.S. Sports Memorabilia Market: \$5.4 Billion", *Forbes*, pp. 5–10.
- Tapscott, D. and Tapscott, A. (2016), *Blockchain Revolution: How the Technology Behind Bitcoin Is Changing Money, Business, and the World*, Penguin Random House LLC, New York.
- The Federal Bureau of Investigation. (2005), "Operation Bullpen", available at: <https://archives.fbi.gov/archives/news/stories/2005/july/operation-bullpen-overview> (accessed 4 January 2021).
- Thomas, M. (2020), "Sports Memorabilia Market Estimated at \$5.4 Billion, but Beware of the Fakes", *Sports Casting*, pp. 1–12.
- Turley, C. (2021), "If you haven ' t followed NFTs , here ' s why you should start", *Tech Crunch*.
- United States Postal Inspection Service. (2019), "Fake Sports Memorabilia", *United States Postal Inspection Service*.
- Weil, D. (2019), "The Market for Sports Memorabilia Continues to Score Big", *The Wall Street Journal*, pp. 1–2.
- Wintermeyer, L. (2021), "Non-Fungible-Token Market Booms As Big Names Join Crypto ' s Newest Craze", *Forbes*, pp. 1–7.
- Zorloni, L. (2018), "Cryptokitties , il Tamagotchi con i gattin che si paga in criptovaluta", *Wired*, Vol. 11, pp. 1–7.