



UNIVERSITÀ
DEGLI STUDI
FIRENZE

DISEI

DIPARTIMENTO DI SCIENZE
PER L'ECONOMIA E L'IMPRESA

WORKING PAPERS – BUSINESS
A series on Accounting, Finance, Management,
Marketing and Organizational Studies

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Working Paper N. 01/2023

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NFTs and business model innovations

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Abstract

Nonfungible tokens (NFTs) use blockchain technology to certify the ownership of digital assets. This study aims to understand the opportunities and limits of NFTs in the innovation of business models (BMs) across various sectors, including auction houses, museums, ticketing companies, and online art exchanges. Specifically, we are interested in understanding the role of NFTs in enabling the decentralization and digitalization of BMs owing to new products, services or processes. By adopting a conceptual approach based on the BM framework proposed by Osterwalder and Pigneur, this study uses a qualitative methodology based on multiple case studies to discuss the unique cases of Christie's, OpenSea, Uffizi Gallery, and Ticketmaster. Our findings suggest that despite the opportunities presented by NFTs in terms of revenue streams, customer interface, digital authentication, and decentralization, many limitations remain, including regulatory uncertainty and ethical and environmental concerns.

JEL Classifications: G30; M10; M41.

Keywords: Nonfungible tokens, NFTs, case study, business model, digitalization, decentralization

The authors wish to thank Filippo Zatti and the members of the research unit BABEL (Blockchains and Artificial Intelligence for Business, Economics and Law) for their expert insights.

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1. Introduction

Nonfungible tokens (NFTs) are marketable digital assets that are generally based on blockchain technology for high assurance through crypto verification (Chen, 2018); NFTs can include unique smart contract content (Yli-Huumo et al., 2016; Nofer et al., 2017). Non-fungibility is a key aspect of NFTs, which may be understood as unique assets (Dowling, 2022b).

NFTs represent a new way to certify the ownership of digital assets (Jones, 2021; Dowling, 2022a; 2022b) linked to unique underlying assets. The use of NFTs has been pioneered by creative industry entrepreneurs who have sought to generate new revenue streams and modes of stakeholder engagement (Chalmers et al., 2022).

Owing to NFTs, content creators can quickly access the market, with transactions both in traditional and virtual currency or cryptocurrencies, in which to sell photos, reproductions of images, art, music or written material, audio files, and anything else that may be digitized. NFTs have therefore had the advantage of breaking down barriers to market access for creators of new content (Morozov, 2021a; 2021b), helping develop new business ideas based on the concepts of non-reproducibility, uniqueness, and exclusivity (Chalmers et al. 2021; Kaczynski and Kominers, 2021). NFTs can be sold or purchased through a marketplace (a sort of trading site) that uses only cryptocurrency for transactions.

One of the first artworks ever created in the form of an NFT was *“Everydays: The First 5000 Days.”* Digital artist Beeple, every day for 13 years, created a digital image and then grouped the 5 thousand pieces into a maxi jpg, which was auctioned by Christie's in 2021 (on the OpenSea marketplace) for 69 million dollars.

There are also products similar to NFTs that have been developed in the art world. For instance, the Italian company Cinello has developed so-called digital artworks (DAWs), i.e., a digital version of an art history masterpiece, produced in its original size in a limited series. These DAWs include that of the digitized reproduction in a limited series of Michelangelo's Tondo Doni.

From the art world, NFTs have extended to various fields and business concepts. The fundamental characteristics of each NFT are the uniqueness, non-replicability, and concept of exclusivity (or, if you prefer, scarcity) of an asset, whether material or digital and artistic or non-artistic.

NFTs also appear to have the potential to find new forms of financing or to hybridize different forms of financing. For example, we see cases of individuals who previously would not have invested in physical art deciding to enter digital art markets.

Despite their rapid growth in popularity, concerns have been raised around the legal ownership of NFT assets and the prevalence of speculation and fraud associated with NFT trading (Chalmers et al., 2022). Furthermore, some basic problems remain unresolved, such as the loss of the cryptographic string of the digital certificate, resulting in the impossibility of accessing the digital property on the blockchain.

Finally, there is a problem related to the environmental impact generated using blockchain technology, which is the basis of NFT generation and conservation. The production of cryptocurrency and related NFTs is highly energy consuming (thousands of maxi computers that work both day and night).

In light of the above factors, the exploratory research question of this paper aims to understand the opportunities and limitations of NFTs in the innovation of the business models (BMs) of profit and nonprofit organizations operating in some of those sectors most directly affected by this technological innovation: museums, auction houses, the ticketing industry, sports clubs, and digital marketplaces. Among the innovations to the BM, we are also interested in understanding the role of NFTs in enabling decentralization (dispersion of organizational communications) and distribution (dispersion of organizational decision making) owing to the digitalization of new products, services and processes (Vergne, 2020).

We base our study on a theoretical framework inspired by the BM framework (Osterwalder and Pigneur, 2004; 2010), which has become extremely popular among organizations and practitioners (Abraham, 2013; Upward and Jones, 2016; Bini et al., 2018). As a part of the BM framework, the BM Canvas (BMC) can help users visually represent the elements of a BM and the potential interconnections and impacts on value creation (Osterwalder and Pigneur, 2010; Joyce and Paquin, 2016).

The rest of the paper is organized as follows. The next section discusses our conceptual framework based on Osterwalder and Pigneur's (2004; 2010) BMC and possible BM innovations in terms of digitalization and decentralization. Section 3 illustrates our methodology based on multiple case studies. Section 4 discusses the case studies and summarizes our findings regarding BM implications. The concluding section discusses our main conclusions concerning the purpose of the research and highlights the main limitations of the study as well as possible directions for future research.

2. Conceptual framework

A BM is "a simplified and aggregated representation of the relevant activities" of an organization (Wirtz *et al.*, 2016, p. 41). Moreover, a BM is also a tool that allows managers to better understand, capture, analyze, and manage the value created by organizations (Amit and Zott, 2001; Magretta, 2002). A BM is a platform that provides a comprehensive and integrated description of the value-creation process of an organization, i.e., how resources, processes, and partnerships are combined to achieve long-term profitability (Nielsen, 2011).

The BM concept is closely linked to three main aspects of value: value proposition, value creation, and value capture (Yang *et al.*, 2017). Each dimension points out the relationships, resources, and actions contributing to a company's competitive advantage. One of the most flexible, widespread, and accepted BM frameworks is that proposed by Osterwalder and Pigneur (2004, 2010), which features nine components divided into four pillars: product, customer interface, infrastructure management, and financial aspects. A discussion of each element can be found in Table 1.

Table 1 - Four pillars of a BM

<i>Pillars</i>	<i>Building blocks</i>	<i>Content</i>
Product	<i>Value proposition</i>	How products and services, as well as complementary value-added services, differentiate a company from its competitors Why a company's value proposition could be valuable to the customer At which stage of the value lifecycle a value proposition creates value
Customer interface	<i>Target customer</i>	How a company identifies its customers Which segmentation strategy a company adopts to identify its customers
	<i>Distribution channel</i>	How advertising, promotions, public relations partnerships, and other initiatives are used to maximize the number of customers Support services involved in the evaluation process and the transactions or after-sales assistance that are aimed at increasing value for the customer
	<i>Relationship</i>	Initiatives aimed at attracting and acquiring new customers Mechanisms to extend the duration of the relationship between a company and its customers Every action aimed at selling additional products and services to current customers
Infrastructure management	<i>Resource and capability</i>	How certain inputs and abilities underpin a company's creation process
	<i>Value configuration</i>	How certain activities drive a company's value-creation process

	<i>Partnership</i>	How various arrangements with one or more entities can create value for the company or customers
Financial aspects	<i>Revenue model</i>	How value proposition affects revenue streams How pricing mechanisms are defined How a company's value proposition translates into financial performance
	<i>Cost structure</i>	How significant costs are managed to reduce their impact on company performance

Authors' elaboration on Osterwalder and Pigneur (2010)

Figure 1 shows the related BMC, which can help users visually represent the elements of a BM and the potential interconnections and impacts on value creation (Osterwalder and Pigneur, 2010; Joyce and Paquin, 2016). The BMC was developed following design science methods and theory underlying BM development, with a focus on providing an accessible visual representation of a business system (Joyce and Paquin, 2016).

Figure 1 - BMC

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
Who are our key partners? Who are our key suppliers? Which key resources are we acquiring from our partners? Which key activities do partners perform?	What key activities do our value propositions require? Our distribution channels? Customer relationships? Revenue streams?	What value do we deliver to the customer? Which one of our customer's problems are we helping solve? What bundles of products and services are we offering to each customer segment? Which customer needs are we satisfying?	What type of relationship does each of our customer segments expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our BM? How costly are they?	For whom are we creating value? Who are our most important customers? Is our customer base a mass market, niche market, segmented, diversified, or multisided platform?
	Key Resources What key resources do our value propositions require? Our distribution channels? Customer relationships? Revenue streams?		Channels Through which channels do our customer segments want to be reached? How are we reaching them now? How are our channels integrated? Which ones work best? Which ones are most cost-efficient? How are we integrating them with customer routines?	
Cost Structure		Revenue Streams		

What are the most important costs inherent in our BM? Which key resources are most expensive? Which key activities are most expensive?	For what value are our customers willing to pay? For what do they currently pay? How are they currently paying? How would they prefer to pay? How much does each revenue stream contribute to overall revenue?
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Authors' elaboration on Osterwalder and Pigneur (2004, 2010).

BM innovation does not necessarily lead to the discovery of a new product or service; instead, it emphasizes new ways to create and deliver the existing product or service, as well as new ways to capture value from it (Yang *et al.*, 2017).

Blockchain solutions can influence an organization's BM and stakeholder relationship and drive strategic competitive advantage (Queiroz and Wamba, 2019; Shaila *et al.*, 2022). Given its wide adoption and ease of use for multiple types of users, the BMC is an ideal foundation on which to expand by innovating in terms of digitalization and decentralization through blockchain.

Blockchain has the potential to enable new BM archetypes by maximizing operational efficiency and encouraging new digital and decentralized business strategies (Bai *et al.*, 2020; Calandra *et al.*, 2022; Chen and Bellavitis, 2020). Vergne (2020) has demonstrated that blockchain enables platform operators that are both decentralized and distributed; decentralization refers to the broad dispersion of the ability to exchange data and information within communication systems, while distribution refers to the dispersion of organizational decision making. The decentralized nature of blockchain creates the new concept of a token economy in which the community's revenue can be allocated to the actual content producers and service users who create value (Lee, 2019).

BMs based on blockchain are a realization of a specific organizational design where people, processes and tasks are decentralized without intermediation (Pereira *et al.*, 2019; Wang *et al.*, 2019). Blockchain can increase social participation and innovation (Calandra *et al.*, 2022; Scekić *et al.*, 2019). Moreover, blockchain paves the way toward developing digitalized and decentralized BMs with new categories of partners, activities, resources, cost structures, revenue streams, channels, customer segments and value propositions (Abbas *et al.*, 2020).

Digitalization is the exploitation of digital opportunities (Rachinger *et al.*, 2019). While digital transformation embraces changes at all societal levels, digitalization combines different technologies (e.g., cloud technologies, sensors, big data, 3D printing, NFTs, and machine learning) to open unforeseen possibilities about new products or services and their delivery

(Matzler *et al.*, 2016). Digitalization not only affects individual firms' BMs but also requires the alignment of the BMs of other firms within the ecosystem (Kohtamäki *et al.*, 2019).

While research on digitalization in the context of BMs is now gaining increased attention (Schaltegger *et al.*, 2016; Joyce and Paquin, 2016), a research gap still exists in this field since the number of empirical insights that focus on the differences and similarities among how digitalization influences a company's value creation is limited (Rachinger *et al.*, 2019). In particular, scant and fragmented scholarly work explaining how organizations can change their traditional BM into a digital and decentralized BM through blockchain has been empirically carried out (Verhoef, 2021).

3. Methodology

To pursue our explorative research aim, we opt for a qualitative methodology based on the method of multiple cross-sectoral case studies. Our research question is exploratory in nature, and we need to provide rich and deep insights to increase the knowledge about the business implications of NFT implementation.

According to Yin (2018, p. 32), a case study is the most appropriate method when “(1) your main research questions are ‘how’ or ‘why’ questions, (2) you have little or no control over behavioral events, and (3) your focus of the study is a contemporary (as opposed to entirely historical) phenomenon.”

Case study methodology has frequently been used in the business and management literature to study BM innovations, i.e., value creation in e-business (Amit and Zott, 2001), sustainable BMs (Iles and Martin, 2013; Keskin *et al.*, 2013), or how small and medium-sized enterprises (SMEs) approach Industry 4.0 (Müller *et al.*, 2018).

Analyzing NFTs across industries enhances our research with differences and similarities from different perspectives on how NFTs generate value. For each sector, we decided to focus on one specific case to deeply study the first mover and extract data about the opportunity and difficulties encountered by the company during the process.

We adopted a selection process of critical cases “on the basis of expectations about their information content” (Flyvbjerg, 2006, p. 230). The procedure involved two steps.

First, we identified the industries. We searched the gray literature and media coverage to identify the industries most interested in NFTs. Second, we detected the first mover and leader in NFT introduction in the selected industries. We downloaded the most relevant reports and

manually scrutinized them. Furthermore, we conducted unstructured searches on Google and newspapers about NFT to identify the most interesting stories for our research. Finally, we selected the cases included in Table 2.

Table 2 - Four selected cases

<i>Industry</i>	<i>Case</i>	<i>Short description</i>
Auction houses	<i>Christie's</i>	On March 11, 2021, Christie's sold its first "purely digital NFT-based artwork," and the record-successful sale marked a significant milestone in the NFT world. The "First 5000 Days" authored by Beeple was sold for more than 69 million US dollars and involved 22 million people during the final moments.
Art galleries	<i>Uffizi</i>	Uffizi Gallery is one of the most visited museums in the world. On May 14, 2021, the Uffizi Gallery in Florence, Italy, sold an NFT of the Tondo Doni by Michelangelo for €140,000 (\$170,000).
Ticketing	<i>Ticketmaster</i>	In October 2021, Ticketmaster launched LiveStubs, a platform of digital collectible NFTs that mirrors the unique section, row, and seat of each ticket purchased, allowing fans to collect ticket stubs once again, this time with more capabilities.
NFT exchanges	<i>OpenSea</i>	Founded in 2017, at the beginning of the NFT era, OpenSea is by far the most important NFT marketplace. In a market with \$17.5 billion in sales, OpenSea has traded approximately \$10.5 billion, managing a 60% market share

Authors' elaboration

Our research relies on secondary and primary data from multiple sources. Using both primary and secondary data and multiple sources enhances the data triangulation (Hopper and Hoque, 2006) and robustness of the research findings. Our secondary data include those for media news and online companies' communication through websites and social media. Our primary data sources are semi-structured interviews and qualitative mail-customized open questionnaires.

We emailed all the companies in our cases asking for a one-hour online interview with some internal specialist or manager on NFT implementation in their BM. For each case, we created the questions for the semi-structured interview. The questions were designed to cover all BM parts and to further investigate the preliminary findings that emerged from other sources. We proposed a written questionnaire when company representatives were unavailable for the interview. Questionnaire questions were the same as those that we would have asked in the interview. The interview schedule is provided in Appendix A.

To further strengthen the inclusivity of the data and minimize selection bias, we adopted a structured procedure to collect news and online communication: a) we extracted the media news data from Nexis Uni® Search (cf. Nandi *et al.*, 2020); b) using a web scraper application, we collected relevant data from the websites of the organizations included in the case studies;

and c) we also scanned official Facebook and Twitter profiles to gather information on NFT implementation (cf. Bellucci and Manetti, 2017).

The next sections discuss the case studies using a case-by-case narrative approach.

4. Presentation of case studies and findings

4.1. Christie's

In March 2021, Christie's sold its first *purely digital NFT-based artwork*, and the record-successful sale marked a significant milestone in the NFT world. The “*First 5000 Days*” authored by Beeple was sold for more than 69 million US dollars and caught the attention of 22 million people during the final moments of the auction. Christie's acted as a first mover, and its success provoked reactions both within its sector and beyond. Indeed, in April 2021, Christie's significant competitors, Sotheby's and Philips, entered the NFT market: Sotheby's sold the collection known as “The Fungible” by Pak for \$16.8 million, and on April 23, 2021, Phillips sold the Mad Dog Jones Replicator, fetching a total of \$4.1 million. By the end of 2021, 'Sotheby's had sold \$65 million worth of NFTs, while Christie's had sold more than \$100 million.

Figure 2 – Christie's official tweet on Beeple's “First 5000 Days” sale



The conventional BM of auction houses involves serving as intermediaries in the transactions of valuable assets such as artwork and collectibles. This market, which generates an average of \$26 billion in sales annually, is largely dominated by two key players, namely, Sotheby's and Christie's.

The value proposition of DAW had become a significant dilemma in the art industry. The question became how to attribute value to digital artwork (DAW), which lacks the tangible and physical properties of traditional art forms. NFTs represent a tool that makes digital art closer

to being a private good and hence valuable and exchangeable, “given (...) the capability the blockchain (...) to check the provenance and authenticity of an NFT” (Christie’s London conditions of sale).

The integration of NFTs into the auction house industry has had significant implications for the channel through which art is sold. The emergence of solely digital art has led to an increasing relevance of digital rather than physical channels.

However, the degree to which auction houses may integrate digital and physical channels varies widely, including physical art that uses the digital channel solely as a channel for holding the auction of a physical object, mixed digital-physical art, and solely digital art. Christie's was again the first major auction house to move within through the sale of Robert Alice's “Block 21,” held in October 2020, for \$131,250. Robert Alice's “Block 21” is a hand-painted work with an associated NFT that shows the time and location of the physical piece.

The successful establishment of a digital art market may attract a younger demographic, which represents a growing and influential segment of customers in the art market.

"Many buyers belong to a new category of wealthy clientele: people who have made their fortunes from cryptocurrencies" (Howcroft, 2021),

and NFTs'

"buyers represent a new cohort for the art market; only three of the 33 bidders on the Beeple, for instance, were previously known to Christie's, and 91% were Millennials (born 1981-96) or of Gen X (1965-80)" (Adam, 2021).

The emergence of digital technologies has brought about new key partners. Among these key partners are digital artists and technological experts. Digital artists bring a unique perspective to creative endeavors, utilizing cutting-edge digital tools and techniques to create innovative works that push the boundaries of traditional art forms. Moreover, technological partners provide critical support in terms of the hardware, software, and infrastructure necessary to bring these creative visions to life.

"In another big digital shift, auction houses often source NFT directly from crypto-artists, in many cases, little-known pseudonymous figures. In the physical art market, by contrast, primary sales of artists are usually handled by galleries, while auction houses traditionally focus on secondary market sales." (Howcroft, 2021)

Therefore, to sell NFT digital art, Christie's must, unlike it had done previously, set and maintain a high level of direct collaboration with artists. Christie's recently launched Christie's 3.0, an on-chain auction platform dedicated to NFT art. Since managing the blockchain and its opportunity is not part of the core business of auction houses, they need expert partners. Regarding this point, we highlight the collaboration between Christie's and OpenSea, the world's leading NFT marketplace, which started in November 2021.

The "*Christie's X OpenSea*" auction yielded 832.5 ETH (\$3.6 million) (Art News, 2021). From the BM perspective, the partnership suggested the need to find a partner to develop a hosting platform for on-chain DAW auctions.

Moreover, as 2020 was characterized by the unprecedented outbreak of the coronavirus disease 2019 (COVID-19) pandemic, many offline auctions were limited and, sometimes, also banned. For Christie's, this meant that it was

“down 25% compared to 2019, driven by the drop in live auction sales (Christie's, 2020, p.1).”

Christie's strategic response was an

“immediate acceleration of its digital strategy at the start of the pandemic that ensured business continuity across the year and expanded the global reach of its sales activities exponentially. Online-only sales were up 262% in 2020 (£243 million/\$311 million), marking a record total for the channel” (Christie's, 2020, p.1).

Following a significant increase in online sales in 2020, Christie's, leveraging the opportunity presented by NFTs in the art sector, inaugurated a solely digital art business. Noah Davis, Head of Digital Art and Online Sales at Christie's (2022b, p. 12), expressed confidence in the resilience of the NFT market, stating the following:

“NFTs are here to stay. Just as exciting is where they go from here.”

The fundamental shift from a physical real-life channel to a digital metaverse channel has necessitated significant changes in how the auction house industry operates. One of the benefits of NFTs is their ability to transform digital art from a public good into an excludable good (Adams and McCormick, 1987) with significant value, thereby making it tradable. To maintain competitiveness in this new landscape, auction houses must develop a less formal approach to customer relationship management and adopt social media networks as a primary means of engagement. Furthermore, new key partners such as crypto artists who directly sell their

artworks and technological platforms for auction hosting are vital for auction houses to remain relevant. Finally, the incorporation of smart contracts in NFT transactions has strengthened the possibility of author fees on future resales, which represents a new opportunity for decentralization (Yao and Mela, 2008).

4.2. OpenSea

Founded in 2017, at the beginning of the NFT era, OpenSea is by far the most important NFT marketplace and exchange. In a market with \$17.5 billion in sales, OpenSea has traded approximately \$10.5 billion, managing 60% of the market share.

OpenSea's strategy is becoming increasingly popular, and other entities are recognizing the vast opportunities that exist within the NFT space. Among the noteworthy competitors, we cite the NFT marketplace launched by Rarible in November 2019, the offering by Binance launched in June 2021, and Coinbase, a prominent crypto-assets exchange, which recently announced its plans to enter the NFT market.

As a marketplace, OpenSea's value proposition broadly centers around facilitating the matching of the supply and demand of every kind of NFT. Various platforms, such as SuperRare and Nifty Gateway, differentiate themselves from OpenSea by introducing intermediaries to select NFTs or by specializing in multiple limited versions of artworks. However, the existence of these platforms raises new challenges to the decentralized nature of the NFT world. During our interview, cryptoartist Annibale Siconolfi noted that these platforms have posed significant challenges to the decentralization of NFTs as follows:

“Certain marketplaces are already considered too centralized today because there is always an organization at the base.”

As all activities between OpenSea's customers occur through its website, it can be argued that the website serves as the primary distribution channel. However, it is worth noting a key differentiation between the distribution channel employed in the NFTs' BM and those employed in other traditional e-commerce websites. In the case of NFTs, the channel through which products are delivered involves the use of blockchain technology. Since NFTs are created on the blockchain, the transfer of ownership to the customer is registered and verified through the blockchain. Thus, we consider blockchain a characteristic component of the distribution channel employed in NFTs' BM. As the OpenSea Chief Executive Officer (CEO) stated,

"Blockchains provide a coordination layer for digital assets, giving users ownership and management permission" (Finzer, 2020).

The launch of OpenSea's mobile application on September 17, 2021, underscored the website's distinctiveness. Notably, this application does not provide a direct means through which to purchase NFTs, thereby preserving the website's status as the sole channel through which transactions may be conducted on the OpenSea platform.

"The OpenSea app basically works as a kind of gallery. [...] The app shares a lot of the same blue and white stylings of the OpenSea site, just missing the button that says 'Buy Now.'" (Campbell, 2021).

The rationale behind this decision may be attributed to two key factors (Campbell, 2021). First, app market owners such as Apple and Google impose a commission fee of 30%, which represents a significant cost. Second, it is not feasible to accept payment in the form of cryptocurrencies for in-app purchases.

In terms of revenue stream in the interview at Forbes (Ehrlich, 2021), Devin Finzer, one of the two OpenSea's founders, stated the following:

"In terms of how we make money, we have a pretty simple BM: we charge a fee on successful transactions."

OpenSea's primary revenue source is derived from fees, amounting to approximately 2.5%. In addition to OpenSea's fees, purchasers of NFTs are subject to ancillary fees, such as "gas fees:"

"Gas is the fluctuating price that miners charge to write new data on a blockchain. The gas price of minting an NFT on any platform ranges from \$2 on a calm day to \$32 on a crazy day" (Atallah, 2020).

Overall, the OpenSea BM is characterized as serving many customer segments and a streamlined revenue model that leverages fees as the primary revenue stream. By utilizing blockchain technology and an intuitive website interface, OpenSea has established a reliable and trustworthy platform for NFT exchange, positioning itself as a leading player in this emerging market.

4.3. Uffizi Gallery

The closure of museums during the pandemic changed their approach to online activities from a means of communication to tools to engage customers (Agostino *et al.*, 2020). In May 2021, the Uffizi Gallery in Florence, Italy, sold a digital version of the Tondo Doni by Michelangelo for €140,000 (Artnet News, 2021). Soon after, in September 2021, the State Hermitage Museum sold a collection of five masterpieces minted as NFTs, collecting more than \$440,000 (Partz, 2021). At the same time, the British Museum announced its involvement with more than 200 Hokusai NFT artworks being put on auction. NFTs have become a new trend in the museum industry. Furthermore, on January 14, 2022, the first museum entirely dedicated to NFTs was inaugurated: the Seattle NFT Museum (Seymour, 2022).

We observe a significant disparity in the BMs between traditional art museums that are beginning to sell NFTs of their collections and those that operate solely in the digital realm. The former represents a transition from a conventional to digital approach, while the latter operates entirely by showing native DAWs.

To investigate the impact of NFTs on museum BMs, we choose to focus on the case of Uffizi Gallery, which was one of the first museums to embrace this new technology. In recent years, there has been a growing interest in studying the digitalization of museums in Italy (Raimo *et al.*, 2021; Agostino *et al.*, 2020).

The Tondo Doni sale garnered significant attention as a DAW sold as an NFT. However, it is important to note that despite this popular perception, the digital copies offered by Cinello, the main partner of Uffizi Gallery for this initiative, are not technically NFTs. During a parliamentary (Camera dei Deputati, 2022) hearing, Alessandro Cavallini, head of R&D at Cinello, clarified the following:

"I refer to recent reports in various specialized news outlets concerning the sale of the digital version of the Tondo Doni, wherein it was erroneously reported that the NFT of the Tondo Doni had been produced and sold. It is not an NFT because it is based on patented technology and is not blockchain based. Therefore, the DAW [Digital ArtWork] has a life of its own, independent of the blockchain." (p.23)

The statement presented herein carries numerous implications from the perspective of our study. First, it suggests a correlation between NFTs and the value proposition of digital art, which is consistent with the findings of our study on the Christie's case. Second, it highlights

the possibility for digital art to exist even in the absence of decentralization when there already is a trusted third party responsible for providing the necessary certification of authenticity. Third, it underscores the evolving nature of the definition of NFTs, which may result in certain digital copies being classified as NFTs, despite not strictly conforming to conventional parameters. Both DAWs and NFTs solve the economic problem of creating digital uniqueness.

On the same track, the Cinello CEO (Camera dei Deputati, 2022) stated the following:

“In attempting to undertake a digital art project, the initial consideration that we had to address was how to make a file unique, given that the primary characteristic of an artwork is its singularity. This is the essence of art and is also relevant in the context of NFTs.” (p.18)

With reference to the customer interface, we conducted an interview with Giacomo Nicoletta, Head of Communication at Cinello, who affirmed the following:

“The customers are the same ones who attend auctions and important art fairs, and they represent the top 1% of wealthy collectors who have shown interest in the recent surge of digital art.”

Selling NFTs is a novel activity for museums, as their traditional BM focuses on acquiring artworks without selling or copying them. This emerging trend presents both opportunities and risks for museums. On the one hand, selling NFTs provides an alternative revenue stream that can help museums withstand lockdowns and other disruptions, and on the other hand, there are legal risks associated with image licensing and copyright, which must be carefully considered (Valeonti *et al.*, 2021). In particular, there is concern that selling a digital copy of an artwork may result in a loss of copyright and the transfer of usage and commercialization rights to the buyer. These legal uncertainties may pose a significant obstacle for state museums, which may face additional bureaucratic hurdles before embarking on new activities such as NFT sales (Batycka, 2022).

The proposition to establish a franchising model for museums to position themselves in the digital art market constitutes a novel concept within the sector, which warrants further attention and monitoring in the future. This creates an opportunity for technological key partners to provide the necessary support and expertise. In the case of Uffizi Gallery, for instance, Cinello served as a key partner since it represents

“an Italian company that is offering a new alternative for purchasing digital copies of masterpieces” (Art News, 2021).

The process offered by Cinello begins with the establishment of a partnership agreement (1), followed by the creation of a file image of the artwork (2) and the application of a cryptography signature (3). The next phase involves the issuance of an original digital copy (4) and a certificate from the museum to the buyer (5). Subsequently, customers are provided with an app to manage their collection (6). Finally, the process concludes with the transfer of 50% of net revenue to the museum (7).

Uffizi Gallery experienced a significant decline in revenue as a result of the COVID-19 pandemic, with a loss of €25 million in 2020, in contrast to the €26 million profit that it made in 2019. This decline in revenue prompted the gallery to explore new revenue streams to mitigate the negative impact of the pandemic.

“In the medium term, [NFT sales] will be able to contribute to the finances of a museum, comparable to the proceeds of the restaurant business,” Eike Schmidt, Uffizi Gallery’s director, told Corriere Della Sera. “It’s not a change of direction in terms of revenue; it is additional revenue. However, creating such a market is not a quick thing.” (Art News, 2021)

The aforementioned assertion bears significance, as it elucidates NFTs as a viable phenomenon for additional revenue streams. This is also confirmed during our interview with Giacomo Nicolella, the Head of Communication at Cinello:

“Also, for the net revenue from the exhibitions that Cinello does, 50% of the revenue goes to the museum. All activities of Cinello are split equally with the museums.”

Furthermore, Uffizi Gallery director (Camera dei Deputati, 2022) affirmed the following:

“It is also conceivable to protect, through smart contracts, museum access tickets. This would ensure that every time a ticket is resold by a secondary vendor, the museum would receive its percentage again. Moreover, if this were desirable from a regulatory standpoint, the percentage could be increased for each resale.” (p. 6)

Thus, NFTs may also represent an additional revenue stream for museums with regard to the resale of tickets on secondary markets. While the impact of NFTs on ticketing will be further explored in a subsequent case, it is noteworthy that NFTs have the potential to enhance the traditional ticketing business of museums.

Overall, NFTs hold significant promise for museums as a novel source of additional revenue streams without substituting them.

4.4. Ticketmaster

Ticketmaster, which merged with LiveNation in 2010, is one of the main actors in the ticketing sector. Ticketmaster and LiveNation have already ventured into the NFT business. In October 2021, the companies launched LiveStubs, aimed at transforming traditional tickets into unique digital assets.

In November 2021, the National Football League (NFL) announced that in partnership with Ticketmaster, it would provide virtual commemorative tickets for fans for select NFL games (Smith, 2021), including Super Bowl LVI. In August 2022, Ticketmaster launched a new capability, its ability to issue digital collectible NFTs to fans, and on March 2023, Ticketmaster launched token-gated sales, enabling artists to reward fans with prioritized ticket access and concert experiences through NFTs.

As shown by Klein (2010) and Schneiderman (2016), there are some predatory practices in ticket marketing: bait and switch, which means diverting tickets to affiliated secondary market sellers; an unknown number of tickets being available for public sale; exorbitant markups; the secondary sale of tickets at or before initial primary ticket release; brokers using insider knowledge and often illegal ticket bots; and the sale of "*phantom tickets*," which refers to tickets that do not exist and are thus considered fraudulent.

Given their decentralized nature, NFTs may be a solution for these market imperfections, increasing transparency and hampering the opportunity for predatory and anticompetitive practice. However, as Howell (2022, p. 17) notes,

"Even though blockchain technology can potentially eliminate the need for intermediaries, these companies may still find space in NFT ticketing through the utilization of consortium blockchains. "

Indeed, the main value proposition for Ticketmaster and LiveNation in introducing NFTs is not necessarily aimed at modifying market behavior or decentralizing their BM but rather at providing additional collectible items to their customers.

"Digital collectible NFTs will mirror the unique section, row, and seat of each ticket purchased, allowing fans to collect ticket stubs once again – this time with more capabilities [...] Our Live Stubs product brings back the

nostalgia of collecting ticket stubs while also giving artists a new tool to deepen that relationship with their fans [...]” said Michael Rapino, President and CEO, Live Nation Entertainment.” (Live Nation Entertainment, 2021)

The value added by the NFT introduction in the ticketing industry is threefold:

“Transparency: NFT tickets are a single source of performance tickets. From generation to sale, all information is transparently published on the blockchain so that all parties can prove the authenticity of the tickets.

Control of the secondary market: Smart contracts can regulate the secondary market and eliminate scalpers at the same time.

Collection: NFTs are unique and have good collection characteristics. Using an NFT ticket makes the ticket not only serve as proof of watching movies and concerts but also improve the fan experience.” (Yuan and Zhou, 2022, p. 1-2)

NFTs in the realm of ticketing are believed to cater to the same audience that has already participated in such events. It is noteworthy that the aforementioned objectives aim primarily at enhancing the market rather than at broadening or captivating a new consumer base. Specifically, in the context of Ticketmaster's employment of NFTs, it serves as a mechanism through which to increase customer engagement. NFTs serve as instruments to reinforce customer loyalty and foster a stronger relationship between event organizers and their audience, not just during the event but also beforehand and afterward. In fact, as NFTs are intended to serve as keepsakes, they facilitate sharing and exchanging among participants, culminating in the creation of a sense of community.

“Ticketmaster is uniquely positioned to help our clients integrate NFTs into the fan journey – for example, by adding on an NFT as they purchase tickets or awarding an NFT as attendees go to shows – there are lots of different ways that NFTs can enhance the fan experience.” (Ticketmaster Business, 2023)

The issuance of digital ticket stubs by Ticketmaster involves a series of novel activities, including the creation and minting of NFTs, as well as the development of platforms that enable customers to receive, store and exchange these digital collectibles.

“When fans scan their tickets upon entry to the stadium, they will become eligible to receive a virtual commemorative ticket. Fans are able to manage their NFTs in a dedicated NFL NFT marketplace powered by Ticketmaster where they can also trade or sell their commemorative NFTs.” (NFL Communications, 2022)

The involvement of Ticketmaster in this process represents a significant evolution from the traditional ticketing model, where the company's role ended with the completion of the event. Thus, Ticketmaster recognized the importance of forming a partnership with specialized blockchain companies such as Dapper Labs to effectively navigate this complex landscape.

Ticketmaster has expanded its revenue streams through the creation of a new marketplace that offers collectible items not only before or during the event but also after the event, thereby capitalizing on related items of interest to fans.

5. Discussion and conclusions

Our research provides insights into the role of NFTs in BM innovation across various sectors, including auction houses, museums, ticketing companies, and online art exchanges. Our findings shed light on the transformative potential of NFTs in driving decentralization (Chen, 2018; Lee, 2019; Pereira *et al.*, 2019) and digitalization (Kenney and Zysman, 2016; Kohtamäki *et al.*, 2019; Raimo *et al.*, 2021) across diverse sectors (Bao and Roubaud, 2022). Through our case studies, we critically discuss the opportunities that NFTs present for innovating traditional BMs (as in the case of Christie's, Uffizi Gallery, and Ticketmaster) or creating new BMs from the ground up (OpenSea). Despite the promising opportunities presented by NFTs in terms of new products and services, financial aspects, infrastructure management and customer interface (Massa and Tucci, 2013; Osterwalder and Pigneur, 2010), many limitations and challenges, including regulatory uncertainty and ethical and environmental concerns, remain.

In the case of auction houses and digital art exchanges, NFTs have opened opportunities for decentralization, as they allow for the direct sale of digital art pieces. Additionally, the use of NFTs has enabled the digitalization of art ownership, making it possible to prove provenance and ownership securely, which has led to greater efficiency, ultimately benefiting both artists and buyers, as well as the need for traditional operators as action houses to reimagine their role in this evolving technological ecosystem. However, the high transaction fees associated with

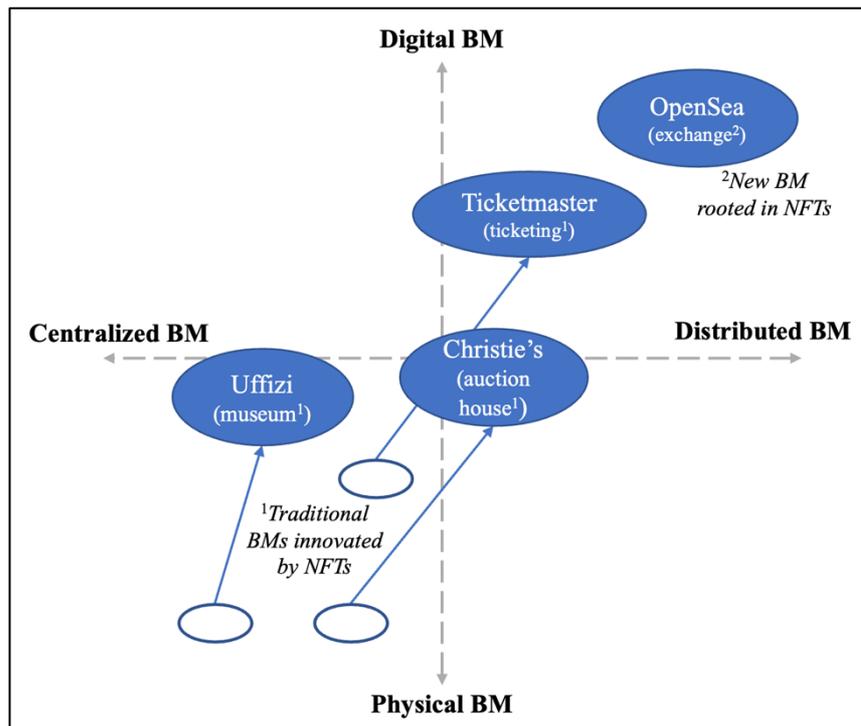
NFTs may deter some actors from participating in the market. Additionally, the lack of regulation in the NFT market can lead to fraudulent activities, which can undermine the trust of consumers.

Our case studies confirm that NFTs can facilitate the tokenization and decentralization of cultural heritage by allowing individuals to own and trade digital versions of famous artworks. From this perspective, NFTs can change how museums operate. By creating digital duplicates of their physical artworks and selling them as NFTs, museums such as Uffizi Gallery can generate additional revenue streams while enabling global access to their collections. Furthermore, our analysis of an online art exchange such as OpenSea highlights the importance of NFTs in creating decentralized marketplaces for digital assets. However, using NFTs may raise ethical concerns about the commodification of art and the cultural value of artworks. Furthermore, the high energy consumption associated with the blockchain technology used to create NFTs raises environmental concerns.

Another traditional industry that NFTs could impact in terms of activities, revenues, and consumer relationships is the ticketing sector. Ticketmaster's implementation of NFTs has demonstrated that the ticketing industry can benefit from decentralized and digitalized BMs. By using NFTs as tickets, event organizers can improve engagement, reduce fraud and unauthorized scalping, and create a more secure and efficient ticketing process. NFTs enable the digitalization of the secondary market, providing increased transparency and control over ticket resale.

Figure 3 stresses the impact that NFTs could have on the BMs of our case studies regarding decentralization and digitalization.

Figure 3 – Potential digitalization and decentralization of BMs through NFTs



Authors' elaboration

In terms of contributions and practical and policy implications from business and management perspectives, our study provides empirical insights to support the ongoing discussion on the following five topics:

a) Opportunities for new revenue streams: NFTs create opportunities for new revenue streams and customer interfaces, particularly in the art and entertainment industries. For example, emerging artists can sell digital art pieces as NFTs, providing a new way to monetize their work. Similarly, musicians and athletes can create unique collectibles in the form of NFTs, offering fans exclusive access to limited-edition content.

b) Decentralization: NFTs have the potential to enable the decentralization and distribution of activities in various industries (Saurabh *et al.*, 2022; Wang *et al.*, 2021). Using blockchain technology, NFTs allow for direct transactions between buyers and sellers, reducing the need for intermediaries (Vergne, 2020) such as agents, brokers, and distributors.

c) Digitalization and authentication: NFTs provide a secure and transparent way to verify the ownership and authenticity of digital assets, which is particularly relevant in industries such as digital art, where the provenance and authenticity of artworks are critical (Wilson 2022). By using NFTs, museums and galleries can provide a secure and immutable record of ownership, reducing the risk of fraud and forgery (Raimo *et al.*, 2021).

d) Ethical and environmental concerns: NFTs have raised ethical and ecological concerns, particularly regarding the energy consumption associated with proof-of-work blockchain technologies. The high electricity consumption required for mining and processing transactions on the blockchain has led to criticisms that NFTs are environmentally unsustainable if they do not use renewable energy (Calandra *et al.*, 2022). Additionally, there are concerns about the impact of NFTs on the commodification of the cultural value of artistic heritage.

e) Regulatory challenges: the need for regulation in the NFT market poses challenges for stakeholders, particularly regarding consumer protection and anti-money-laundering measures. As NFTs become increasingly adopted, there is a need for regulatory frameworks to ensure the integrity and transparency of the market (Chalmers *et al.*, 2022), which could include requirements for identity verification and transaction monitoring.

This article is not without limitations and provides space for further investigation. First, we resort to written asynchronous online interviews (with companies' representatives or their main partners) when company representatives were unavailable for the interview. The questions were the same as those we would have asked in the interview, but synchronous semistructured interviews would have allowed for more flexibility and depth. Second, although our research is based on four major case studies in four sectors that have already been impacted by the introduction of NFTs, further research should continue to explore the impact of NFTs in other industries (e.g., utilities, real estate, value chains, and certifications) and identify their real potential in terms of BM innovations.

Appendix A – List of questions for each case used as the basis for our semi-structured interviews

Christie's

1. What makes Christie's 3.0 business model (BM) innovative? What role does blockchain play in it?
2. Which role do nonfungible tokens (NFTs) play in Christie's 3.0 business model?
3. Regarding the value proposition of NFTs, why do people buy them?
4. Who are Christie's key partners in dealing with NFT? Why?
5. What is the main difference between Christie's 3.0 previous experiences and its experience with NFTs?
6. What services will Christie 3.0 provide, and what will its revenue streams be?
7. In terms of the customer segment, which kind of people buys NFTs (age, interest, and geographical collocation)? What is Christie's 3.0 aim?
8. What makes a platform for NFT exchanges better than other types of platforms?
9. What risks are associated with NFTs, and how are they managed?
10. What role does decentralization play in the NFT market? Could NFTs exist without decentralization?
11. What about the future? Will NFTs replace physical art markets?
12. What will be the future evolution of blockchain and NFTs in auction house business models?

OpenSea

1. What makes your business model so innovative? What role does blockchain play in this process?
2. What are your main revenue streams?
3. Regarding the value proposition of NFTs, why do people buy them?
4. Regarding your value proposition, why should people buy NFTs from you and not from others?
5. Regarding the customer segment, why did you choose not to specialize in a market niche such as games or arts?
6. In terms of the customer segment, which kind of people buy NFTs (age, interest,

- and geographical collocation)? Which kind(s) are more profitable for you?
7. How important is your website for your business? Could it be considered a key resource for your business? What are the most critical factors that make your website so important?
 8. You have recently launched a new mobile app. Why is it not possible to buy NFTs directly through that app? Are you planning to add this functionality?
 9. Have you ever thought about investing in a physical market? Do you see your future only in the digital world? What are your strategies for physical and digital markets?
 10. What will be the future evolution of your business model? What about NFT exchanges in general?

Gallerie degli Uffizzi

1. What makes Christie's 3.0 business model innovative? What is the role of blockchain in it?
2. How do NFTs fit into Christie's 3.0 business model?
3. What is the value proposition of NFTs? What motivates people to buy them?
4. Who are Christie's key partners in dealing with NFTs? Why?
5. How does Christie's experience with NFTs differ from its previous experiences?
6. What services will Christie's 3.0 provide, and what will be its revenue streams?
7. What is the demographic profile of NFT buyers? What kind of customers does Christie's 3.0 aim to attract?
8. What factors make a platform for NFT exchanges superior to other types of platforms?
9. What are the risks associated with NFTs, and how are they managed?
10. What is the role of decentralization in the NFT market? Can NFTs exist without decentralization?
11. Will NFTs replace physical art markets in the future?
12. How will blockchain and NFTs evolve in auction house business models in the future?

Ticketmaster

1. What can be the consequences in terms of business models from the introduction of NFTs in the "ticketing" sector?

2. What is the role of NFTs in "ticketing"? Do you predict that in the future, tickets will be issued as NFTs, or will NFTs represent a collectible accessory to be paired with traditional tickets?
3. Why would a Ticketmaster customer desire or should desire an NFT?
4. What could be the role of Ticketmaster in a decentralized ticketing system with NFTs?
5. How could NFTs increase transparency in the "ticketing" sector? Are they suitable tools for preventing ticket scalping?
6. Have new partners emerged in the management of NFTs for Ticketmaster (for example, technology companies)?
7. In some sectors, such as the art industry, NFTs are proposed as tools that allow for the transition to digital channels. What effect do NFTs have on the digitization process in ticketing?
8. What are the new revenues and costs that emerge for Ticketmaster from the introduction of NFTs?
9. In terms of customer relations, what does the introduction of NFTs entail?
10. What kind of assistance does Ticketmaster offer its customers for managing NFTs?

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