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"DIGITAL TRANSFORMATION AND ART:
A MARKET EVOLUTION ANALYSIS"

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1. Introduction

In the past two decades, the global landscape has been marked by an increasingly pervasive use of technologies that belong to the so-called “Fourth Industrial Revolution”.

If we look back, each age has been marked by inventions that determined its subsequent evolution and growth. The first industrial revolution was driven by the invention of the steam engine; the second industrial revolution by the discovery of electricity that changed the lives of millions of people around the world and the third revolution by the invention of the computer and the Internet.

The revolution we are experiencing in this moment, on the other hand, is characterized by a considerable number of technological innovations that are being rapidly adopted in different sectors and whose application can be defined by one single term, digitalization.

Digitalization and the adoption of new digital technologies have been a growing and developing trend for decades now, able to invest in all sectors and markets, among which the art sector is certainly not excluded.

The art world throughout history has always been sensitive to technological advances and a fertile ground for their application. We can think about the invention of the camera and the subsequent birth of photography in the 19th century. From then on, art will be continuously shaken by technology that will bring new expressive possibilities. In recent years for example Digital Art and NFTs are emerging, but also subsequent debates on their legitimacy and their real artistic value.

The current global economic scenario, disrupted by increasingly unpredictable events such as the recent Covid-19 pandemic crisis and the conflict between Russia and Ukraine, have led these two realities, art and digital, in the past more distant from each other to meet and merge more and more, turning new threats into opportunities through the use of innovative and modern digital tools.

Technologies that are increasingly pervasive in our daily lives, such as the Internet, Virtual and Augmented Reality, Blockchain and Artificial Intelligence are changing the way artworks are created, displayed and exchanged, increasing the efficiency and effectiveness of the marketplace and extending its access to an increasingly broad and complex audience.

Audiences are also changing following the technological evolution. Over the past two decades, it has become increasingly mobile and connected, not only present in traditional offline channels but also in online channels (omnichannel), but above all increasingly informed thanks to the considerable amount of information that is able to obtain thanks to the Internet.

Within this vast audience, emerge especially the younger generation of Millennials and Generation Z, the future of the art market. They have been surrounded since birth by new digital technologies, they are always connected through the use of devices and are therefore more intuitive, multitasking and extremely social than previous generations.

They represent a new challenge for a traditional sector such as the arts, that must learn how to evolve in order to become more inclusive and meet their needs, and to do this it must make use of the new digital tools.

This convergence of art and digital is leading and will lead in the future to change the rules of the market, and the players operating in this sector will have to innovate in order to adapt to the new demand through the application of new strategies to keep in line with their competitors and meet the needs of this new, increasingly broad and multiform audience. It is not a coincidence that looking around, more and more new professional figures are emerging in the field of art such as the Social Media Manager, the Data Scientist, the Art Project Manager, and especially new platforms for the online sale of traditional and Digital Art.

The primary objective of this final paper is to represent and analyze the evolution over the years of the art and collectibles market, focusing in particular on the influence that the process of technological innovation has had, which over time has become an increasingly important and indispensable factor for this traditional sector that exists there since ancient times.

To do this, the structure of this composition is organized according to four chapters, starting with the two main themes, the digital transformation and the art market, and then representing the encounter between these two worlds, both from a theoretical and empirical point of view through some interviews with organizations of this sector.

The first chapter introduces the definitions of the concepts of digitization, digitalization and digital transformation, pointing out how these words are mistakenly considered synonyms and how they are related to each other. Next, the presentation of the 5 pillars of digital transformation described by Rogers (Customers, Data, Innovation, Value, Competition), which are useful for engaging a successful enterprise digitalization conversion. The enabling technologies for the digital transformation process are then described, represented by the IOT, Big Data, Cloud, Augmented and Virtual Reality, Blockchain and Additive Manufacturing, respectively. The first chapter concludes by setting out the concepts of Business Model Innovation and Digital Skill Revolution, because any change necessarily requires an evolution and a deep cultural transformation.

The second chapter begins with the description of the concept of the art market and its historical evolution. This is followed by an economic analysis of its two components (supply and demand) and by the description of segmentations of this market that may follow different

criteria, the main ones are surely primary and secondary. Afterwards the overview of the main actors involved on the demand and supply side (the artist, the dealers, the auction houses, the museums and collectors). Finally, it is then emphasized how the demand for art assets has grown during the recent 2020 pandemic crisis as art can be considered a form of alternative investment to financial assets, and the current market situation is then described, based on the Art Basel & UBS report, where trends and future prospects based on the digitalization of the sector emerge.

For this reason, the third chapter defines how the digital revolution has affected the art market. At the beginning, this application is presented at the level of artistic work or artifact. For example, we can think about Digital Art or works made through 3D Printing. Digitalization then also finds application at the promotional level with the use of social media by different sector players (like museums, fairs, galleries..) to reach a global community, and the advent of online sales channels, like marketplaces and platforms, to meet the needs of a new omnichannel customer community. The chapter concludes with the description of the current digital situation in the art market after the Covid-19 pandemic crisis based on Hiscox and Art Basel & UBS reports.

The fourth chapter of this paper aims to qualitatively analyze, through some interviews conducted with sector players, the digital solutions adopted within this market to understand how digitalization has now become essential for the evolution and survival of this sector. Finally, the elaboration closes with a detailed conclusion that also highlights the implications of the analysis conducted, the limitations and some suggestions for further future research.

2. The digital transformation

As described in the introduction of the thesis, this chapter will analyze one of the two main themes of investigation, the digital transformation.

Specifically, the analysis introduces the definitions of the terms digitization, digitalization and digital transformation, mistakenly confused with each other and considered as synonymous. Next, the description of the 5 pillars of digital transformation presented by Rogers in his book (Customers, Data, Innovation, Value, Competition), which enterprises need to know in order to successfully undertake the digital conversion of business processes.

At the basis of the digital transformation process there are also certain enabling technologies, represented respectively by IOT, Big Data, Cloud, Augmented and Virtual Reality, Blockchain and Additive Manufacturing.

Finally, the chapter concludes with a brief exposition of the concepts of Business Model Innovation and Digital Skill Revolution, because any change at the company level necessarily requires an evolution and cultural transformation by people belonging to different organizations.

2.1 Definition of the terminology

Digitalization is one of the challenges imposed by the current historical period, and the recent Covid-19 pandemic crisis has accelerated the pace and fueled a sense of urgency from all markets and sectors about the need to promote a strong transition towards more digitalized processes and systems.

In the literature, the terms digitization, digitalization and digital transformation are often used indiscriminately and erroneously as synonyms, creating confusion for the reader. In reality, these three terms have quite distinct meanings, that's why in this section we will attempt to clarify and distinguish these three important concepts.

To do this, it is first necessary to introduce the main basic concept, the digit. The digit is a number, and computer science adopts a binary number system, so it uses only two symbols, denoted by 0 and 1 (the digital bits), instead of the ten digits used by the decimal number system. From this binary number system comes the concept of *digitization*, or “the technical process of converting streams of analog information (images, video and text) into digital bits of 1s and 0s with discrete and discontinuous values” (Brennen and Kreiss, 2016, p.1).

This conversion then allows computer equipment to be able to store and transmit information, and there are a multitude of practical examples of this process. An example is simply scanning a photograph to create a digital file, as well as converting a handwritten report to a PDF file or recording a presentation or a call to convert a physical sound into a digital file.

What needs to be emphasized from the definition here, is that it is the information that is digitized, not the processes. And this is where the second important concept in that paragraph, the digitalization, is connected. Over time, numerous definitions of this concept have been given by different authors, and here we present the main and most important ones in order to better understand this term and distinguish it from the previous.

With the term *digitalization* we mean “the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business” (Gartner IT Glossary).

This has an impact not only at the corporate level but also for society as a whole, and for this reason a further definition describes it as “the changes that the digital technology causes or influences in all aspects of human life” (Stolterman and Fors, 2004, p.689).

As can be well understood from these definitions, while *digitization* means the simple conversion of analog data into a digital format or rather, the dematerialization of information and its separation from the physical storage, transmission and processing media; *digitalization* means a more profound transformation process and describes the consequences resulting from the adoption of these technologies in different contexts.

Digitalization therefore means adapting all practices and processes, not only business but also social, to the demands of the digital age, where speed, efficiency and effectiveness of process execution are critical in order to compete and survive in today's global landscape.

In people's social lives, this has a great impact in the way they live and interact with each other. We can think about how today smartphones and social networks are changing the way we meet and interact with other people.

Interactions are evolving and moving from an analog format (handwritten letters, phone calls) to a digital format (the use of email, social posts, chats on WhatsApp), digitalizing both leisure and work. At the same time, the skills needed by people in the work are also changing, in a context where digital skills are increasingly a prerequisite for job and personal success.

A further distinction should also be made between the terms “digitalization” and “digital transformation”, that are interconnected and associated with the use of digital technologies, but not equivalent because digital transformation includes more than digitalization, more than the simple application of digital technology.

The *digital transformation* according to Goran et al. (2017) requires not just technology but also the alignment of strategy and other factors, such as people, culture, mindset, talent development and leadership.

This broad strategic business transformation is customer-driven and requires a cross-cutting organizational change in addition to the implementation of digital technologies.

The starting point here is to open the mindset and culture of the company and management to adapt the processes to the new needs of the market and the new desires of the modern customer through the possibilities offered by new technologies.

The digital transformation then, is not simply the integration of digital technology into different business areas, but includes a range of social, organizational, managerial and cultural innovations that generate changes in the way businesses operate in the marketplace and how they deliver value to customers.

So ultimately, while digitization and digitalization are essentially about technology, digital transformation is not. Digital transformation is more about people than technology and requires customer-centric organizational changes, supported by the leadership, leveraging technologies that empower and enable employees to act and change the world.

Figure 1. The relationship between digital transformation, digitalization and digitization



Source: Gupta, M. S., 2020. What is Digitization, Digitalization, and Digital Transformation?
Arc Advisory Group [online], 1 (1).

2.2 Digital transformation pillars

As was expressed in the previous section, the digital transformation is a long and complex process that does not rely on technology alone but has a more important impact because it touches the intimate sphere of people, their culture and mindset.

For this reason, the management of an organization of any nature and sector, in order to understand how to implement a digital transformation process and maximize its final effect in business performance, must understand which aspects it should focus on.

To answer this complex question, it is then necessary to analyze the five pillars that David L. Rogers (2016) in his book “The digital transformation playbook” considers as the basis for an efficient and effective enterprise digital transformation strategy. The five pillars he identified are the following: customers, competition, data, innovation and company value proposition.

Figure 2. The Roger’s five pillars



Source: Rogers, D. L. (2016). *The digital transformation playbook: Rethink your business for the digital age*. Columbia University Press.

2.2.1 Customers

The protagonist of the digital transformation is the customer who, compared to the past, is no longer seen by companies as an isolated individual but within a network consisting of

multiple individuals and companies, where technology represents a tool under his or her control. This is especially evident in marketing that, thanks to the advent of ICT and digital technologies, has assisted the creation of new communication flows.

Before the shift from analog to digital in consumer relations, most businesses were built according to Rogers (2016, p.22) following a “*Mass-Market model*” that presents the company as the center of the network and around it multiple isolated passive customers.

These customers are connected unidirectionally to the central business with no possibility of dialogue with other elements of the network and no possibility of providing feedback to the central business.

As can be well understood from the name, this model is mostly adapted to a mass market, where the purpose of business marketing is to reach as many consumers as possible, to inform and persuade them to purchase the new product or service.

With the advent of the digital era, this model evolves, transforming itself into the so-called “*Customer Network*” (Rogers, 2016, p.22), where the relationship between company and customers finally becomes two-way, and individuals can connect with each other.

The company remains active in the creation and promotion of its product/service, but the role of the customer changes and now has the opportunity to provide feedback to the company and collaborate with it in the final value creation process.

In addition, customers, connected with each other through the use of different platforms (ex. Social networks such as Facebook, Instagram but also websites such as TripAdvisor, The Fork), can share their experiences in using the product/service with other elements of the network, creating an atmosphere of collaboration and mutual influence.

The power in this new model shifts to the connected customers and according to Kotler (2017) it's moving from a vertical, exclusive and individual relationship to an horizontal, inclusive and social one.

Inclusive thanks to the economic growth of new emerging markets in the global landscape and a population from the young middle class (the Millennials as expressed earlier) that has led to a growth in demand for goods and services and a flurry of innovation due to significant investment in R&D.

Horizontal because the new disruptive role of technologies is changing the rules of competition among the industries (ex. the entrance of Xiaomi and Apple in the automotive sector) where it is not just size that matters but the ability of companies to collaborate with other actors in the network. The relationship between companies and their consumers is no longer vertical but horizontal where they are considered peers and friends of the brand.

Therefore, the company must be honest and reveal its true character and personality in order to appear trustworthy.

Social because thanks to the interactions between users, no longer mediated by the central enterprise, virtual spaces are created in which people can share their opinions, interests and emotions. Customers are no longer passive targets but become active means of communication, not more controllable as in the past by companies that therefore have to be transparent and proactive in handling any complaints, without hiding faults and undermining their credibility.

Rogers (2016) also identifies five main behaviors that drive consumer adoption of a new digital experience and reflect five corresponding strategies that companies may implement.

The *access* strategy, represented, for example, by e-commerce, which aims to be fast, easy and ever-present because customers are constantly looking for simplicity and convenience of the product or service they want.

The customer also assumes an attitude of *engagement* with digital content that is interactive and relevant to their needs. Therefore, the company must create new and useful content for the consumer to search, consume and share with their network.

The *customization* of experiences with the product/service offered to customers is important. Increasingly, companies are tailoring their product through targeted media and messages, creating appropriate content through direct observation.

The *connect strategy* is for the company to seek to become part of the conversation in social media among consumers, to solve their problems and requests, get closer and gain their trust.

Finally, the *collaborate strategy* involves the customer not only in creating content but also in becoming a part of the company, helping it in the implementation of new projects and goals. This is the most complicated behavior to implement because it requires the right motivations to push the individual to participate in the business.

2.2.2 Competition

The second pillar of digital transformation described by the author is the competition and relationship between businesses, which has changed with the advent of the digital age and has become more complex.

Whereas in the past competition between businesses took place within an industry with well-defined boundaries, today these boundaries are slowly disappearing and becoming fluid, as is the distinction between partners and rivals.

Every relationship between firms today is becoming a mix of cooperation and competition, so “*coopetition*” (Rogers, 2016, p.53) where actors compete directly in some markets but cooperate as partners in others. Coopetition that, contrary to popular imagination, enables the company's long-term, sustainable survival, aimed at a joint research and development of new products or services, integrating the complementary resources and expertise and lowering the research and development costs for both the players involved.

In this situation a key to success is to go beyond products and to build a *multi-sided platform*, a tool through which the interests of multiple audiences can be combined, creating value for different categories.

The *multi-sided platform* concept has been studied over time by various theorists, but the most precise definition to describe this business model is the one provided by Andrei Hagiu and Julian Wright (2015, p.1) according to whom the *multi-sided platform* is a business “which get two or more sides on board and enable interactions between them”.

From this definition we can understand that the key elements of the platform are the ability to bring together different parties that would otherwise never be in contact with each other, to create direct interactions that must be directed by the platform itself, and to facilitate these interactions while leaving a certain degree of freedom.

One of the key factors of the platform is that its value grows in direct proportion to the use made by people due to the so-called *network effect*.

It can have an impact on the direct and indirect growth of the platform, as growth in the number of consumers of a product drives growth in value and utility beyond the same type of users to those on the other side of the platform. For example, the high number of Visa credit card users allows the merchant to be more likely to accept payments with this type of circuit, in addition to those of Mastercard and American Express.

It is important to note that platforms have always existed even before the advent of digital technologies, and according to David S. Evans and Richard Schmalensee (see Rogers, 2016, p.58) they can be distinguished into four different types:

- *Exchanges*, that link two distinct groups for the exchange of value and where each group is attracted by the number and quality of the counterpart (ex. Amazon);
- *Transaction systems*, that are platforms that act as intermediaries to facilitate certain types of transactions (ex. PayPal);
- *Advertising-supported media*, platform that creates attractive media content for customers (ex. a Newspaper connect readers and companies through advertisements);
- *Hardware/software standards*, that uniform a standard product design for the benefits of customers (iOS and Android as Operative Systems for smartphones).

2.2.3 Data

The third pillar of digital transformation concerns the data collected by companies in their customer interaction processes, which are analyzed in order to understand market trends.

Prior to the digital revolution, data were used to measure and manage long-term technical and operational plans, and this process was time-consuming and costly. Now, however, with the rapid spread of mobile devices, the increase in people's connectivity, and the development of connectivity and storage technologies, generating and obtaining data for businesses has become easier, faster and cheaper.

Data has become an intangible asset and a key intangible resource for businesses, in a context where billions of people around the world routinely use social networks such as Facebook, Instagram, Twitter and Pinterest, continuously producing useful information to understand their behaviors and thoughts. But while collecting data and information is the easy part, the biggest challenge lies in understanding what data we really need and how it can be used to monetize it and create value. For this reason, Rogers (2016) in his book defines five principles for an effective *Data Strategy*.

First of all, it is necessary to *use different data types*, each with different purposes. Therefore, while business process data is used to manage business operations, product/service data is used for product innovation.

Data must be *used as a tool for the decision making process*, because the biggest mistake is to collect data and not use them. It is therefore necessary to implement the so-called *data-driven decision making (DDDM)*.

Data must be *used for product innovation*, because collecting information about the user's behavior allows the company to anticipate their actions and attitudes, creating a tailor-made customization.

You also need to *concentrate on what customers do, not on what they say*, because their behavior is more valuable than their words.

Finally, it is helpful to *use data from different sources*, in order to diversify the risk and obtain more accurate, valid and reliable information.

Data is therefore a key resource for the survival and evolution of the enterprise in order to adopt the best, most efficient and effective strategy. In the next section we will go into more detail about the definition of Big Data and its characteristics as belonging to the technologies that are the basis of the digital transformation process.

2.2.4 Innovation

The use of data by companies is at the heart of the fourth pillar of the digital transformation process, which is innovation.

Innovation according to Schumpeter (1911) must be distinguished from invention, which does not necessarily involve bringing a new product or process to market. Innovation represents the applicative dimension of an invention, and Rogers (2016, p.124) defines it “as any change to a business product, service, or process that adds value”.

Traditionally, innovation concerned the finished product and was the result of the analyses of the people involved in the project. Now, in the digital era, this process represents a continuous experimentation and learning based on feedback provided by customers, and focuses not only on the product but on the real problem to be solved.

Thanks to technologies, this process becomes less slow and expensive than in the past and open to all (open-innovation). For example, many companies before launching a new product, rely on expert users from outside the company (lead users) giving them the opportunity to test their product in advance to verify its effective use and get suggestions for further improvements to be implemented.

Rogers (2016, p. 129) in particular distinguished two types of experimentation, “convergent” and “divergent”.

The *convergent experiments* are used to improve an existing product or service and it is a simple, quick and logical process to find the most effective answer to a particular problem.

The *divergent experiments* are instead used for creating something completely new and unexpected, resulting in being more spontaneous, nonlinear and free to find multiple solutions and creative ideas.

To operate successfully, the business must be able to balance both types of experimentation, at different times and in different areas of application. Applying experimentation in a business is not easy, and for this reason in order to maximize success, the company must keep in mind seven basic principles described by Rogers (2016).

The first is to start the *experimentation from the beginning* in order to learn from its own possible mistakes right away, before launching a particular product or service to the public.

The company also needs to *be fast* in order to gain a competitive advantage over competitors and establish itself as a standard in the market.

The third is to “*fall in love with the problem, not the solution*” because by focusing on user problems it is possible to determine different solutions and to apply the best one.

The fourth is to *get credible feedback*, not from yourself or colleagues, but from actual or potential consumers and then *measure parameters that really matter* for the success of the innovation.

Another principle is *hypothesis testing* through continuous ongoing experiments and finally to “*fail smart*” accepting mistakes because they are part of the business and understanding what is not working. These mistakes allow understanding any gaps between what actually is and what theoretically should be.

In conclusion, innovation in the digital age must be based on continuous experimentation and error resolution through data and consumer feedback. However, profound changes in market needs can lead to a deeper and more relevant change, which must be anticipated in the digital age and which we now describe in the next section.

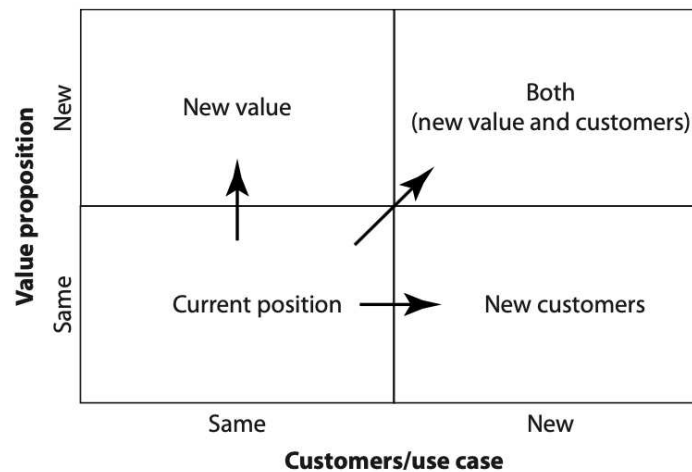
2.2.5 Value

The final pillar of digital transformation is represented by the *company value proposition*, which in the modern era is no longer defined by the enterprise but by the changing needs of consumers. It therefore represents the value that a company offers in the marketplace, expressed in terms of the perceived benefits, both tangible and intangible, that consumers can get from this unique solution, compared to those offered by competitors, proposed by the company.

If in the past the value proposition was seen as something static and fixed, now it has become dynamic and the advent of digital technologies has not only impacted existing business models but created new ones, and while some firms have been able to adapt their value propositions, others have failed to take this important step. There are many examples of companies that were unable to evolve their business model and then failed, for example, Blockbuster compared to Netflix or Nokia compared to Apple.

In some situations new technologies have increased a rejuvenation and growth of an industry while other times they have shown difficult situations with contracted market positions in which there are no opportunities for consumer growth. For this reason, following the matrix designed by Igor Ansoff (see Rogers 2016, p.170) it is possible to identify three growth paths characterized respectively by three different types of strategies that can be implemented.

Figure 3. The Ansoff's matrix



Source: Rogers, D. L. (2016). *The digital transformation playbook: Rethink your business for the digital age*. Columbia University Press.

The first path is to look for *new customers* to which the same value proposition can be offered. This path is characterized by lower economic risk because it does not involve new and large investments, but it may present the risk of failing to identify a new market segment and in the event that one is identified, that it will not be accepted.

The second option is to continue serving the same market segment, but creating a *new value proposition* that turns out to be compatible with their current needs.

The third and final possible path for firms is to choose to act on *both sides* of consumers and their perception of value. In this case, companies by changing their value proposition are able to identify and capture new market segments thanks to the opportunities offered by digitalization, which limits and in some cases removes the barriers that during the analog era prevented companies from entering other sectors.

Having seen and analyzed how companies today must rethink the pillars of the digital transformation process (customers, competitors, data, innovation and value proposition) to overcome the limitations of the analog era and adapt to the new global scenario, we will now introduce in the next paragraph the technological tools that are the basis of this digital transformation process.

2.3 Digital transformation technologies

Today, the global economic scenario is in the middle of the fourth industrial revolution, characterized by the recombination of existing technologies and the rise of new ones based on the use of Big Data and information.

This new paradigm of Industry 4.0 is based on the digitalization of businesses and the use of increasingly intelligent and interconnected devices and machines, creating new and powerful ecosystems. For this reason, many studies have been developed over time to understand and define the characteristics of the technologies that are at the center of this ongoing revolution, and in this part we will try to define the technologies that are revolutionizing not only the industrial but also the artistic landscape, as we will see in the next chapter. The technologies here described are the following: IOT, Big Data, Cloud Computing, Virtual and Augmented reality, Blockchain and Additive Manufacturing.

2.3.1 The IOT

The development of wireless technologies in recent decades has led to a new paradigm called IOT (Internet of Things).

This concept was first introduced by Kevin Ashton of Procter & Gamble (1998) to define the ability and the capacity to connect different products to the Internet. The Internet of Things comes from the idea of bringing everyday objects, which surround us inside our homes, at work, in cities and in our daily lives, into the digital world.

These products, combined with complex systems of hardware, software, sensors, data storage and microprocessors, are the basis of so-called “smart and connected products”. According to Porter et al. (2014, p.5) the “*smart and connected products*” have three fundamental components: *physical*, *smart* and *connectivity*.

The *physical components* include the mechanical and electrical parts of the product, such as in the case of a car the engine and batteries.

The *smart components* include sensors, processors, data storage, software, as in the case of a smartphone the iOS or Android operating system.

Finally the *connectivity components* which include ports, antennae that allow wired e wireless connections, which can be divided into three types:

- *one-to-one* where a single product is connected to the user or to the producer;
- *one-to-many* where a central system is connected to many products simultaneously;

- *many-to-many* where multiple products are linked to many other types of products.

The Internet of Things is a technology with a wide range of potentials and benefits, which knows no application boundaries.

From the car connection to communicate real-time information to the driver, to other vehicles on the road or to the surrounding infrastructure to prevent car accidents, to home automation with the aim of reducing energy consumption and improving the comfort, safety and security of the home and the people within it. From monitoring the climate parameters to support the agriculture sector to improve the production quantity and quality, reducing the resources used and the environmental impact, to the connection of industrial plants, operators and products that enable new production management logic and new product lifecycle management.

The application of this technology has progressively led to more efficient and optimized control of processes in various sectors, with reduced costs, new innovations and benefits, but above all the ability to collect and analyze a large amount of data in real time to use in the decision-making processes.

2.3.2 *Big Data*

As we know, the global market for interconnected mobile devices is constantly growing, and with it the amount of data and information being collected and analyzed in real time by these devices.

One has only to think of how the use of data collected by companies through the social networks profiles of billions of users has revolutionized the world of marketing and advertising by customizing the messages addressed to them.

This enormous amount of information is called Big Data, and over time several definitions have been given, including in particular the one that define Big Data as “a term that describes large volumes of high velocity, complex and variable data that require advanced techniques and technologies to enable the capture, storage, distribution, management, and analysis of the information” (Mills et al., 2012, p.10).

There are different methods of storing data, which then allow them to be divided according to certain characteristics: *structured* when the data are organized in tables and according to fixed patterns; *unstructured* when there is no pattern at all and this is typical of the Internet world (mail, images, video, etc.); *semi-structured* when they have hybrid characteristics between the previous ones.

The term Big Data suggests and emphasizes the huge volume and dimension, but the magnitude is not the only property of Big Data and in particular Yin and Kaynak (2015) underlines how they are characterized by the so-called *Five Vs*:

- *Volume*, where that size refers to the amount of data that is created, replicated and consumed. This volume always tends to increase over time, which requires greater storage and processing capacity based on increasingly powerful hardware and software.
- *Variety*, which refers to the type of data that can have different scale, distribution and representation. In particular, while in the past data were mainly expressed in the form of numbers and text, today they are also expressed in the form of images, audio and video, and all of this has made this analysis increasingly complex.
- *Velocity*, which refers to the frequency and speed with which data are produced, transmitted and analyzed. Today this magnitude tends to be so high that data are collected and updated in real time.
- *Veridicity*, dimension that refers to the completeness and consistency of the data collected. In fact, what really matters is not only the quantity of data but also its quality and the absence of errors.
- *Value*, which is difficult to estimate prior to the process and is associated with the ability not only to collect but also to analyze and understand the data to gain information useful for decision making. Here it is crucial to determine whether the benefits of these data outweigh the associated costs of collection and storage.

It is this last characteristic that allows us to understand the definition of Big Data Analytics, that is “the analytical tools used to manage the flood of data and turn the flood into a source of productive and usable information” (Maltby D., 2011, p.2).

To do this it is necessary to create a working environment supportive to the production, collection, sharing and analysis of data. This translates to the term Data-driven culture, which must be sponsored by the top managers to show how data is necessary and beneficial in the decision making process and that their use will enrich the expertise within the company. This communication must reach all levels of the company, who must necessarily be trained on what it means to deal with data.

The current challenge is not so much to collect and store data but to make effective use of it, that is, to generate value from it. This can be linked to the notion of *data monetization*, that is, the ability to derive economic value from data collected through new technologies, which according to Parvinen et al. (2020) can be classified as *internal* (the use of data within the

organization to gain economic advantage improving existing processes and products) and *external* (involving the activities of selling, exchanging and sharing data with other actors and partners outside the company).

2.3.3 Cloud Computing

Behind the large and growing amount of product functionality and data, it has become increasingly necessary for companies to define an environment in which all this information can be collected, stored and transferred, while ensuring real-time access and use. This gave rise to a technology that emerged with the advent of the digital age and is revolutionizing the global landscape, the Cloud Computing.

Over time, many definitions have been given to this technology, and among them we highlight the one provided by the National Institute of Standards and Technology: “Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (ex. networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction” (Peter Mell, 2011, p.2).

One of the main and popular examples of Cloud Computing is Google’s family applications (Docs and Spreadsheets, Calendar, Gmail ecc.), hosted on Google’s servers and accessible by any user with just a simple Internet connection.

Specifically, most Cloud Computing services fall into three main categories:

- *Infrastructure as a Service (IaaS)*, in which the user leases the IT infrastructure (servers, storage etc.) from a provider. The customer is active and has the control over the operating systems and data storage, controlling the network components and leveraging the processing and storage capacity of their operating system;
- *Platform as a Service (PaaS)*, in which customers access an on-demand environment to develop, test and manage software applications. This is the case with Google, which is proposing this platform to support Android applications;
- *Software as a Service (SaaS)*, in which applications are made available by the provider through a web interface and clients have no influence on the platform and its infrastructure.

The application of this technology at the enterprise level has enabled companies to not only to automate and integrate but also to facilitate business management and administration by virtualizing resources and services and combining client/server-based systems.

In particular, according to Brian H. et al. (2008) the organization-specific benefits from the application of Cloud Computing can be summarized as follows:

- cost reduction in the sense that organizations no longer have to invest money in building their own IT infrastructure;
- speed of innovation because cloud services can be delivered on a few hours' notice instead of weeks, reducing time to market as much as possible;
- high availability given by large cloud providers due to their ability to scale such technology;
- scalability and flexibility of cloud services that enable rapid adaptation of IT to changing business needs;
- efficiency in that the organization can focus only on its core business;
- security because the backup of data is done continuously especially when providers use servers spread all over the world avoiding risks such as failures, disasters and cyber attacks.

2.3.4 Virtual and Augmented Reality

Technological progress and digitalization have allowed some technologies such as AR (Augmented Reality) and VR (Virtual Reality) to become increasingly common and accessible for consumers.

The two terms are often confused with each other, but they are actually different and can be considered according to Gandolfi (see El Miedany, 2019, p.545) “as two sides of the same coin. They both aim to extend the sensorial environment of an individual by mediating reality through technology. The former relies on an alternative setting to experience, while the latter improves existent elements with additional layers of meaning”.

As we can understand from this definition, while Augmented Reality allows digital elements to be projected into a real space enriching it with information, Virtual Reality through the use of special viewers allows the user to enter a completely new and out-of-reality world.

The application of Augmented Reality is based on mobile devices such as smartphones, tablets or wearables such as glasses (ex. Google Glasses) that through the internal GPS system and the Internet network allows to maintain a flow of information that is overlapped

with the real image. Contexts of application of such technology can take place in tourism or museums, but also in games such as Pokemon Go or Ikea's "Place" app for viewing a virtual piece of furniture in one's home.

Virtual Reality, on the other hand, requires special viewers connected to a PC or console with powerful graphics processors, as well as special gloves and joysticks to increase the user's immersive sensation, allowing the user to experience tactile, visual and auditory sensations identical to reality. For this reason, such technology has high costs and the scope of application is limited to particular contexts. An example of application of this technology occurs in the medical field, where a surgeon can operate on a patient remotely while being thousands of kilometers away from the actual operating room.

The common purpose of such technologies is to improve knowledge by increasing the amount of information that is perceived by the subject compared to normal observation of reality and to allow the cognitive distance between the subject and the object to be reduced.

With the advent of increasingly powerful mobile devices capable of supporting such applications, AR and VR from simple technologies used mainly for “gaming” or particular specialized fields, may find application in every field in the future.

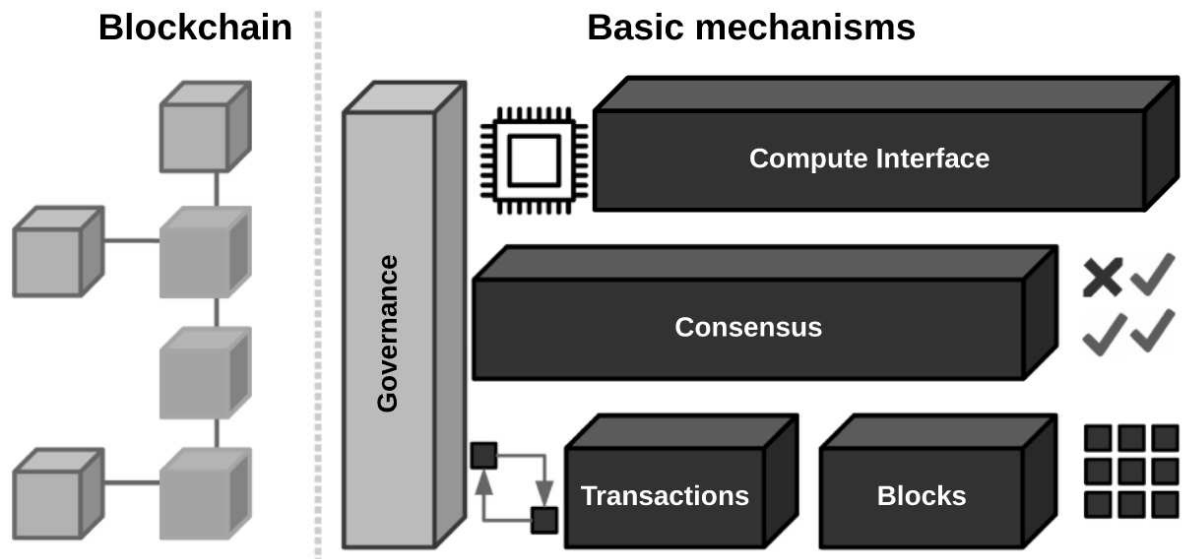
Their positive trend has not yet reached the peak of popularity due to the high development costs of these technologies, but the big tech companies such as Meta, Microsoft, Google and Apple are working hard by investing in R&D to turn this niche technology into something popular, with the goal of overtaking smartphone sales in the next decade.

2.3.5 Blockchain

The Blockchain technology appears for the first time in a white-paper entitled “Bitcoin: A Peer-to-Peer Electronic Cash System” published in 2008 by Satoshi Nakamoto who proposes a new decentralized transaction model for cryptocurrencies such as Bitcoin that eliminates intermediaries (banks, notaries, financial institutions), reducing risks and costs for stakeholders.

This technology is not the basis of cryptocurrencies alone, but has found application for transactions of multiple assets, whether tangible (houses, cars, money, land) or intangible (intellectual property, patents, copyrights, branding).

Figure 4. The architecture of the Blockchain



Source: Casino, F., Dasaklis, T. K., & Patsakis, C. (2019). A systematic literature review of blockchain-based applications: Current status, classification and open issues. *Telematics and informatics*, 36, 55-81.

Following the pattern and explanation offered by Casino et al. (2019), the structure presents at the lowest level transactions, signed between peers, that represent an agreement between two participants to transfer physical or digital resources. For example Paolo transferring a Bitcoin to Luca. At least one participant signs this transaction, which is then disclosed to his or her neighbors.

Each entity connected to the Blockchain is called a *node*, and nodes that verify all Blockchain rules are called *full nodes*. These nodes group together transactions into *blocks* and determine whether or not transactions are valid or not.

At the *consensus* mechanism level, nodes must reach an agreement on which transactions should be kept in the Blockchain to ensure that there are no corrupt branches and divergences. The *Compute Interface* allows blockchains to offer more functionality: a Blockchain stores a state, such as the set of all transactions made by users, while the Compute Interface allows complex states to be stored that are dynamically updated using distributed computing.

Finally, the *Governance level* extends the Blockchain architecture by covering human interactions that occur in the physical world.

Even if well-defined, Blockchain protocols are influenced by inputs from different groups of people who integrate new methods, improve the protocols, and patch the system. Although these parts are necessary for the growth of each Blockchain, they constitute processes external

to the chain. Therefore, Blockchain governance deals with how these different actors join together to produce, maintain or modify the inputs that make up a Blockchain.

Blockchain in particular has many features that make it leading-edge: decentralization of information that is recorded by distributing it among multiple nodes to ensure security; traceability as each item on the registry turns out to be traceable back to its exact origin; disintermediation of handling transactions without intermediaries; transparency of registry contents that can be easily accessed by all; immutability of data that cannot be changed without consent and programmability of certain actions when certain conditions occur.

Also if Blockchain applications are widely distributed, many issues still need to be addressed, such as the lack of regulation, the negative impact on the environment in terms of the energy required to generate new blocks and the small number of transactions that can be conducted per second. When these issues will be addressed, Blockchain can become not only more scalable and efficient, but also more durable.

2.3.6 Additive Manufacturing

This technology is certainly not new in industry because the need to adopt it for prototyping occurs as early as the late 1980s. Additive manufacturing, also known as 3D Printing, refers to “a group of modern manufacturing technologies that are used to produce three dimensional prototypes from CAD representations. These methods are generally similar to each other in that they add and bond materials in a layered fashion to form objects” (Prakash et al., 2018, p.3873).

As one can well understand from the definition, the process takes place with the deposition of liquid, solid or powdered material until a three-dimensional object is obtained, then adding material through the continuous dialogue between computer and machine.

Specifically, the process begins with the development of a digital model, converting it into a standard additive manufacturing format, sending the file to the printer and finally making it layer by layer followed by cleaning and finishing.

This type of manufacturing requires a longer build time, which is why it is particularly popular in industries that have specific quality and precision requirements and are characterized by low production volumes. For this reason, the various sectors in which it is applied include biomedical, aerospace and automotive, but as we will see later, also in art.

In addition to the long lead times for product realization, the disadvantages of this technology include the speed of additive machines, which is not comparable with traditional ones, and the

limitation of materials that can be used compared to traditional machines. Added to this there is the high cost of purchasing a 3D printer and in the small size of the work that can be carried out.

At the same time, this technology also has numerous advantages. These include the absence of limitations and constraints in making the shapes that are to be produced (which can therefore be customized) because there are no tools or molds, as well as the reduction in the Time To Market that occurs between the design of the product and its delivery to the end customer. Another advantage is the efficiency of the resources and materials used, especially if they are particularly expensive and difficult to work with, eliminating waste because only the quantity needed to make the product is used.

In conclusion, additive manufacturing represents a technology with considerable potential and a wide range of action in all sectors. As the technology has progressed, its application has continued to shift from prototyping to small-scale production for some particular industries (aerospace, automotive, biomedical), although it still remains a niche technology.

To gain further adoption by other industries, investment in R&D is needed in terms of design, materials, new processes, and machines in order to expand its application and make it a mature technology.

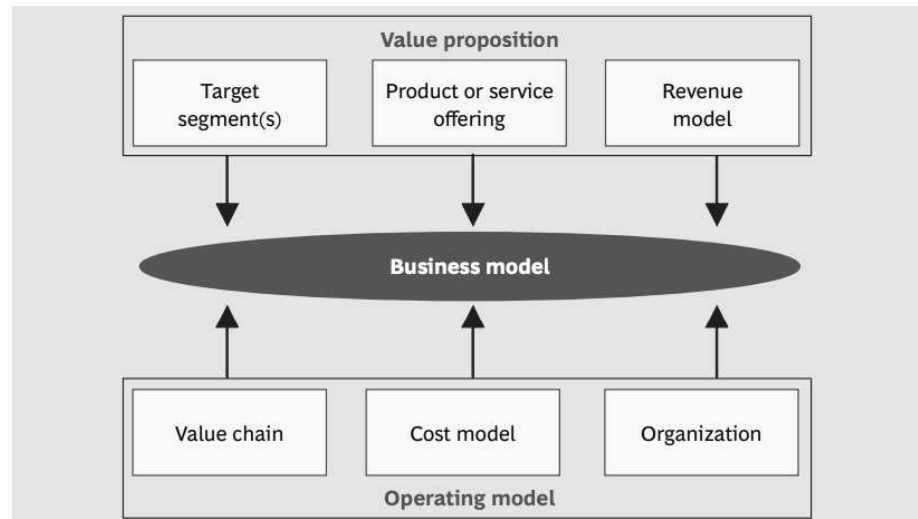
2.4 Digital business model innovation

The advent of digital technologies previously described has enabled companies to revolutionize and enrich their existing product/service offerings, creating new and innovative business models. The most famous and popular examples of business models are the Google Free-Model, the Spotify Freemium Model, the Apple TV On-Demand Model, the Amazon Marketplace Model, the Firefox Open-Source Model etc.

Before describing this process of technological innovation, however, it is necessary to define the concept of a business model, which can be represented as a structured and analytical model that defines the way “by which the enterprise delivers value to customers, entices customers to pay for value, and converts those payments to profit” (Teece, 2010, p.172).

According to Lindgart et al. (2009) a business model consists of two essential elements: the value proposition and the operating model, each divided into three sub-elements.

Figure 5. The Business Model Structure



Source: Lindgardt, Z., Reeves, M., Stalk, G., & Deimler, M. S. (2009). Business model innovation. *When the Game Gets Tough, Change the Game*, The Boston Consulting Group, Boston, MA, 118.

The *value proposition* define what the company offers to its customers and is based on choices made by management regarding:

- *target segments*, or the set of customers that form the relevant market for the business and to whom the company wants to target its value;
- *product/service offering*, that is, what the company offers to meet the needs of this target consumer;
- *revenue model*, or how the company is compensated by the offer it proposes.

The *operating model* defines how the company transfer value to its customers in a profitable way and is represented by choices made by management relative to three critical areas:

- *value chain*, or how business operations are configured to meet customer needs, what is done in-house and what is outsourced;
- *cost model*, that is, how assets and costs are configured to profitably transfer value to customers;
- *organization*, or how the company manages people to sustain and improve competitive advantage over competitors.

Foss and Saebi (2017, p.13) summarize and define a business model innovation (BMI) as “designed, novel, nontrivial changes to the key elements of a firm’s business model and/or the architecture linking these elements.”

These changes, which exploit the benefits of new technologies, must be consistent internally and externally within the company and can lead to deep transformations not only with respect to products, but also to the processes and the company's organizational structure. But why should a company renew its business model?

Business model innovation is especially important during times of crisis and instability. It allows a company to find a way to exit from the intense competition due to the ease of imitation of the product/service offered, to gain a lasting competitive advantage by better responding to customer needs and generating a solid base of differentiation from competitors. Business model innovation can lead the organization to discover new market opportunities and expand its portfolio by occupying a new market space and attacking the key leaders in that market. It can also help the organization reduce costs or improve the perception of value from the customer's perspective, helping to increase business performance. In most cases, technological innovations are much more expensive than product and process innovation but can bring superior and longer-lasting economic returns.

Many companies implement this innovation in a defensive manner to protect businesses that are increasingly reducing or to defend themselves against aggressive competitors. But in reality, such innovation turns out to be more productive when it is proactively adopted by the company to identify new and unexplored business.

However, digital BMI is not easy for the company to achieve, and implementing it effectively requires having a prepared and ready management that can inspire the entire organization to achieve the end goal. To do this it is necessary to have a strong promotional process for the culture of innovation, putting employees with the right skills in charge of driving that shared vision, as we will see in the next paragraph.

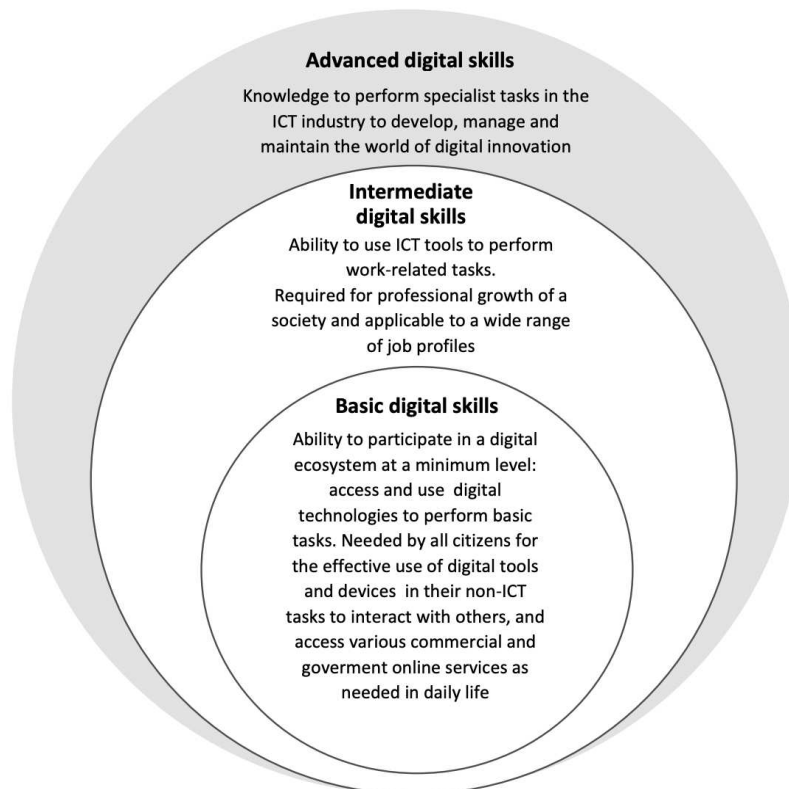
2.4 Digital skills revolution

“The human capital of a business or an organization is the key catalyst for implementing change” (Gulati and Reaiche, 2020, p. 41) and the success of digital transformation and digital BMI is less about technology and more about people skills.

The Skills Revolution due to the rapid technological advancement brings with it new skills needed by today's businesses and shorter time frames for employing them. This leads enterprises to adapt to this changing scenario with mechanisms for training and continuous improvement of human resources.

In particular, in the Digital Literacy Global Framework (DLGF) developed by Unesco, three types of multidisciplinary digital skills are identified as required to cope with the continuous changes in the labor market and prepare for the future workforce market.

Figure 6. The types of digital skills



Source: ITU Publications, 2021. ITU [online], 1 (1).

These three types of skills can be described in the following way:

- *basic digital skills* that enable individuals to participate in the ecosystem by using digital devices to do simple tasks. For example, the ability to use a pc, create and send emails, search for information on the Web and make online transactions to purchase goods/services;
- *intermediate digital skills* involving professional use of business software and data management. For example using word processing software, spreadsheets to visualize data, dedicated software for analytics and project management;
- *advanced digital skills* covering research, design, development, installation and management of ICT software and systems. For example this category includes software development, web design, app development, cybersecurity skills, cryptography.

In addition to digital skills, following Frankiewicz & Chamorro-Premuzic (2020) there is a need to focus attention on the so-called soft-skills, as well as hard-skills. In particular, companies need to invest in the people who prove to be the most curious and adaptable because, as previously mentioned, skills evolve over time and there is a need to invest in those who are most likely to keep up with the times and develop them in the future. Technical expertise is temporary and becomes obsolete over time, while curiosity is permanent.

These may include, for example, cognitive flexibility, that is the ability to have an open and elastic mind; emotional intelligence, which is necessary for team collaboration and understanding others' emotions; creativity for developing new ideas; critical thinking, which involves using logic and reasoning to evaluate new projects and problem finding and solving skills, that is, the ability to find and act quickly to resolve some critical issues.

In order to cope with these new demands, companies must equip themselves with an organizational structure, suitable for innovations, learning and seamless integration among people. And for this reason, such change must be driven by trained leaders who are open to innovation and able to make the organization work as a true team.

As can be well understood from this first chapter, digital transformation at the corporate level is more than just a conversion and it's also about the cultural and mental factors of people within the organization; it is a long and complex process that involves not only the knowledge of key pillars (customers, competitors, data, innovation, value proposition) but also the adoption of new technologies (IOT, Big Data, Cloud Computing, AR and VR, Blockchain and Additive Manufacturing). All these factors, combined with employees' digital skills driven by the top management, can lead to the innovation of the business model, especially needed during times of crisis and instability.

After the presentation of this topic, the theoretical study continues in the next chapter, where the concept of the art market is presented and analyzed, outlining its characteristics, the actors involved and the current scenario.

3. The art market

As described in the introduction of the thesis, this chapter will analyze one of the two main branches of investigation, the art market.

In particular, the analysis will focus on the unique characteristics of this market, which differ from the behavior of a commodity good, in terms of history, classification, supply and demand dynamics and actors involved in the exchange process.

First, however, it is necessary to define that this market is not limited to the trade of the so-called fine arts, represented by paintings and aquarelles, sculptures, drawings and photographs. In fact, this is a global market that also includes the decorative arts (antique furniture and design, fashion and jewelry, objects of different materials) and collectibles (wine, coins, books, vintage cars, stamps, toys) characterized by rarity and profound historical importance.

Having made this due clarification, in this chapter we will describe in detail the concept of art and the art market, its operating characteristics, the phenomenon of art as a form of asset investment and the current digital scenario in this sector.

3.1 Art market definition and history

Art has always played an important role in human history and culture. Since ancient times it has been a testimony of the evolution and development of our civilization, and over time it has been admired, appreciated and preserved.

Throughout history, however, art has also begun to be considered from an economic and financial aspect, leading to the emergence of the so-called *art market*. Before defining and describing the art market, it is first necessary to analyze the meaning of its fundamental component, the art.

According to the definition provided by the Treccani encyclopedia, the term *art* means “in a broad sense, any ability to act or produce, based on a particular set of rules and cognitive and technical experience, thus also the set of rules and procedures for carrying out a human activity with a view to certain results”.

Art therefore represents a medium and language, different for each person and not codifiable, that conveys emotions and messages, leading to the creation of works with a strong creative and aesthetic value.

“It is inevitable that when a desired commodity like art is created and made available, a distribution system forms around it” (Robertson, 2005, p. 13) and this distribution system is called the art market where, according to Velthuis (see Towse and Hernandez, 2020, p.33), “suppliers and buyers of works of art exchange cultural objects such as paintings, antiquities or sculptures”.

As we can understand from these two definitions, the art market represents the set of economic transactions through which artworks are exchanged and for which actors engage in the exchange of these goods.

The earliest forms of art trade can be traced back to the Classical Age of the Greeks and Romans, where art production was primarily linked to patronage by the state and the patrician noble families. Later, with the fall of the Roman Empire and the advent of the Medieval period and Christianity, this market began to be managed by the Church of Rome, resulting in a significant reduction in the volume of production of works of art and artistic goods, which would only increase again with the advent of the Renaissance. During this period, Florence and Italy emerged as the main centers for the production and exchange of art goods first, and later, from the 15th century, the Netherlands.

In the following centuries the art market sees England as the main nation while “the structure of the contemporary art market, based on the system of private galleries, emerged in France in the last decades of the nineteenth century in opposition to the closure and rigidity of the official organization of the plastic arts dominated by the Académie des beaux-arts” (Poli, 2011, p.3).

The 19th century, characterized by major social and cultural revolutions, saw Paris and Europe as the cultural center, a leadership that would be lost from the early 1900s with the development of New York and the American market. The 1929 Stock Market Crash and the subsequent two World Wars also affected the arts sector, whose slow recovery came during the economic boom of the 1950s-60s.

The Big Apple became the center of avant-garde art and the quotations of young American artists reached very high figures, driven by the media and speculation, which led in the late 1980s to the outbreak of this speculative bubble, followed by a period of depression.

Starting in the 2000s, the art market experienced a recovery marked by the resulting artistic decentralization from America to Europe, but at the same time also to a polarization of markets with the strong rise of the Asian market, represented primarily by China and Japan.

Starting from 2003, values began to rise gradually until 2008 where, in the climate of the financial crisis and global economic recession, the art market also experienced a severe and dramatic decline. By 2010, the art market began its recovery again, returning to pre-crisis

values and achieving new records, driven by America and Europe's recovery from the economic crisis and China's strong continuous growth.

As can be well understood from this brief time summary, the art market, like all other markets as well, follows global economic trends, being affected by major events throughout history (the Stock Market Crash of 1929, the two World Wars, the economic crisis of 2008). After overcoming these events, however, this market has always managed to recover with great speed and flexibility.

Having defined the concepts of art and the art market, we now go on to analyze the latter in detail, describing its two components of supply and demand, the market segmentation that can be adopted and the different actors involved.

3.2 The art market economics

3.2.1 *The supply and demand for art*

Supply and demand are the fundamental components in determining the existence of any market. In the art market at the base of the supply of artworks there is the *artist*, who produces not only for his own personal expression but also for merely economic and commercial reasons. According to the classification made by Heilbrun James (2001) artistic products can be considered as two forms: *commissioned* or *speculative*.

Commissioned art products are those specifically requested by a customer who knows the artist and his or her technique and appreciates it. We can, for example, think of the countless portraits belonging to the 1700s and 1800s that were commissioned by noble families and the religious figures of the time, which can be found for sale today in antique markets spread around the world as well as on online platforms.

Speculative art products, on the other hand, are those made by the artist without any guarantee of sale. In this case, the artist invests time, skill, and materials to produce an artwork that may or may not be purchased on the market at an acceptable price. For example, we can consider the unlucky Van Gogh who painted innumerable self-portraits and post-Impressionist landscapes during his lifetime without having any buyer except for his brother Theo.

For this reason according to Schneider e Pommerehne (1983) the artist's supply of works depends on two factors: the *cost of making* them and the *expected selling price*.

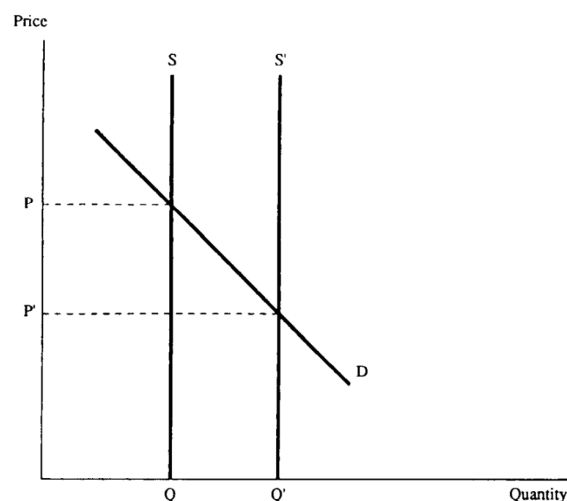
The higher the cost of making an artwork, the lower the artist's intention to invest considerable resources and time with the risk of no financial return if the artwork is not then appreciated by the public. On the other hand, the higher the expected selling price, the greater will be the artist's willingness to make an artwork even if it requires considerable effort and resources because the final profit will be high.

As can be clearly seen in Image 7, the market for a particular artist is characterized by the two curves of supply and demand. The demand curve appears to be decreasing, because as the quantity of artworks made by the artist increases, the price decreases, becoming more “common”, popular and less exclusive. For this reason, the artist often decides to offer his artworks in the market sparingly, in order to prevent oversupply from depressing and lowering the price and value of the works.

The supply curve appears vertical because the quantity offered in the market is fixed and determined by the artist. As we can clearly see in the representation below, a shift of the supply curve from left to right (from S to S') determines a greater quantity of artworks offered in the market and a decrease in the market price (from P to P').

This is the same logic that we can also find, for example, in the luxury watch market, where producers like Rolex, in order to maintain their image of exclusivity and rarity, decides to voluntarily reduce and keep at a low level below demand the amount of watches offered on the market, in order to maintain the high price of the products.

Figure 7. The price impact of supply increase by the artist



Source: Heilbrun, J., & Gray, C. M. (2001). *The economics of art and culture*. Cambridge University Press.

In reality, however, the supply-side of the art market does not present the artist as the only protagonist, but also other important figures to whom he is often subordinate, such as critics and financiers, especially at the beginning of the career when the artist turns out to be still unknown to the majority.

We will also try in the following paragraphs to shed light on these figures, who from behind the scenes and as “non-producers”, manage the art market, determining the quantity offered, the price and deciding an artist's success among the general public.

The demand for artistic goods includes a considerable number of participants (collectors, dealers, museums, corporations, privates), which, thanks to the globalization and the advent of new digital technologies with the consequent removal of physical and cultural barriers, have led to a significant expansion of the audience and increase in demand itself.

All of these participants, which we will analyze in detail later, differ in some characteristics (size, awareness, taste) but share some features that determine the demand curve and allow it to move favorably (resulting in increased prices and earnings) or unfavorably (resulting in reduced price and value of works).

According to Heilbrun James (2001) the decision to buy artistic products depends on certain attributes:

- the *wealth*, or the total economic resources available;
- the *expected return* compared to other assets and given by its ownership for a certain period;
- the *expected risk*, which is the degree of risk and uncertainty associated with the return of the asset;
- the *liquidity*, or how easily and quickly the asset can be converted into cash;
- the *tastes and preferences*, or aspects of a qualitative nature often also associated with fashions.

Regarding the first attribute, it is easy to understand that people who are wealthy can buy more assets than those who are not wealthy, including art.

Of course, not only wealth is necessary but also the culture, education and knowledge of this market, which many wealthy people may ignore. In general however, increasing resources and wealth leads to an increase in the purchase of art assets.

The degree of the response of demand for these goods to changes in wealth is determined by the elasticity of demand to wealth:

Equation 1. Elasticity of demand to wealth

$$\epsilon_W = \frac{\% \Delta Q}{\% \Delta W}$$

Source: Heilbrun, J., & Gray, C. M. (2001). *The economics of art and culture*. Cambridge University Press.

which in the case of artistic assets, so products with a great value that are present on the market in limited or even in a single number, we expect to have a value greater than 1 and therefore can be associated with luxury goods.

The second attribute measures how much we expect to receive from owning the asset and can be represented by this formula:

Equation 2. The economic return of art

$$r = \frac{P_{t+1} - P_t + S}{P_t}$$

Source: Heilbrun, J., & Gray, C. M. (2001). *The economics of art and culture*. Cambridge University Press.

where r means the economic return, P_{t+1} the expected price in the future, P_t the price paid and S the non-monetary benefit received by the simple enjoyment of owning such an asset for a certain period of time.

It is precisely this benefit that allows us to distinguish two figures that we will see later, the collector who presents a value $S > 0$ and the pure speculator who sees the art as a mere tool from which he can derive purely economic benefits.

The previous equation can be rewritten to identify the price offered by the economic actor to purchase the artistic good by obtaining the following formula

Equation 3. The price to purchase art

$$P_t = \frac{C + P_{t+1} - 1 + S}{1 + r}$$

Source: Heilbrun, J., & Gray, C. M. (2001). *The economics of art and culture*. Cambridge University Press.

which allows us to understand, since the speculator has an $S=0$ (because he derives no aesthetic benefit from owning the work), that the collector is always willing to pay more for an artistic good than a mere speculator can offer.

The third attribute concerns the degree of *risk* associated with owning the artwork. The buyer who purchases a masterpiece not only for pure aesthetic taste but also to benefit financially in the future, must analyze and assume the price at which he or she can resell that work in the future. For this reason, he must be able to recognize for example in the case of a work created by an emerging artist, the probability that this artist will become famous in the market and see the value of his artwork increase, or if not, how much value he or she may lose in the future.

Equation 4. The expected return of art

$$E[P_{t+1}] = p1(\%) \cdot (E2_{t+1}) + p2(\%) \cdot (E1_{t+1})$$

Source: Personal elaboration

Since the individual tends to be risk-averse, the interest and price we are willing to pay to purchase an emerging artwork turns out to be lower than that of an established artist.

Fourth factor in the demand for art assets is the *liquidity*, that is, how quickly and simply an asset can be converted into cash through its resale. If its liquidity is high, the work will present a higher price than that of another artist who is instead more difficult to resell.

Fifth and final factor in market demand is consumer tastes and *preferences*. They can evolve over time, decreasing or increasing the value of a particular artist. Such evolution may be brought about by the advent of a new trend or simply by general economic mutation.

An example of this shift is the change in luxury furniture in homes, where until ten to fifteen years ago the French taste of the 1800s was the dominant one, but with the subsequent advent of the economic crisis of 2008 and the change in style, it has been forgotten in favor of Italian and Nordic design furniture.

After having briefly described the supply and demand in the art market, we now move on to introduce the types of segmentation that can be identified.

3.2.2 Art market segmentation

The classification and segmentation of the art market can follow different criteria. For example, it is possible to segment the market according to the time factor, determining the

market for *ancient art* (up to 1492, the year of the discovery of America by Christopher Columbus), *modern art* (from 1492 to 1789, the year of the French Revolution) and *contemporary art* (from 1789 to the present).

Following a geographic classification, it is possible to distinguish the market into local, national and international, while following the type of works, into painting, sculpture, photography, music, etc.

However, the most frequently used type of segmentation is the one that classifies the market according to a distribution parameter into two subcategories, *primary* and *secondary*.

The *primary market* represents the segment in which “individual artists provide works to galleries, local art exhibitions, or directly to find customers” (Gérard-Varet, 1995, p. 511).

Works are therefore first introduced into this market and their initial economic value is set. This value reflects the dynamics of the market supply and demand and is affected by the transition costs and the imperfect information.

These costs are especially present in the artworks of new emerging artists as opposed to more established ones (risk that the emerging artist will remain unknown in the future) but also in so-called “neophyte” buyers, those who due to lack of experience are unable to recognize and determine the real value and quality of an artwork without considerable time and effort.

This market is characterized by an exclusive link that is created between the producer-artist and the first buyer (usually a gallery owner or dealer). The artist then provides the creative artworks, while the dealer provides his knowledge and experience of the market, assigning each piece a price (not too high) that reflects the so-called “reserve price”, or the lowest price the artist is willing to accept.

The prices of new artists' operas are deliberately kept low for the first time, in order to encourage purchase and to determine a sell-out. This allows later in the subsequent exhibitions to increase the desire to purchase the artworks, increasing their price and value.

As one can well understand, this market is characterized by increased risk, large price fluctuations and information asymmetries. A limited number of galleries and dealers dominate it through exclusive contracts with promising living artists, so consequently by definition ancient, modern and part of contemporary art remains excluded from such a market and belongs to what is called the secondary market.

“The *secondary market*, also called the dealer market, is substantially more concentrated on both sides” (Gérard-Varet, 1995, p. 511).

Here, as well, the main players are galleries and dealers, but also auction houses. In this market, existing artworks (previously passed through the primary market) of artists about

whom better and more detailed information are available, reducing the typical risk of buying unknown pieces.

The time between the primary market and the secondary market therefore makes it possible to increase the reputation and market knowledge of the artist and consequently in the case of being appreciated, decide on a higher exchange value of the artworks.

Information costs in the secondary market have declined over time thanks to the advent of new technologies and the emergence of numerous platforms that are specialized in providing, even to newcomers and not only to experienced people, information related to the artist's life and his or her quotation. This has allowed the secondary market to stabilize over time, reducing information asymmetries and transition costs by making the prices of artworks in the market publicly available and accessible to all.

3.2.3 The art actors

The art market is made up of a multitude of players who over time have grown in number and some have evolved to meet the new needs of the public. In this section we are going to analyze the different figures one by one, describing their main characteristics that determine their fundamental role within this complex system.

The artist

The first and most important figure is surely the artist, in the past constrained by the rules of production imposed by external actors (think, for example, of the numerous and precise standards defined by the Church or the Academies) while today finally free from the rules, with a full possibility of expression.

“The title of *artist* is given to workers who see themselves, and are seen by others, as producers of artistic objects and ideas” (Lena and Lindemann, 2014, p.72).

If in the past his sustenance came from the princes, the Courts and the Church, today it is determined by the market, whose success is marked by the presence of intermediaries and in which he assumes the role of an entrepreneur or producer to meet a specific demand.

His works, which determine the creation of the market, can take on not only an aesthetic function, but also a cultural and political one, reflecting the image of the society of the time and promoting a form of denunciation for change (for example the Realist painting in which

there is often a denunciation by the artist of the precarious living conditions of workers in the mines and in the countryside).

According to Alan Bowness (see Reutter M., 2001) four stages can be distinguished in the path of recognition taken by the artist to achieve fame and success:

- the recognition by the surrounding artistic environment, where other artists begin to appreciate his/her work and recognize the talent;
- the attainment of the artist's name and artworks to serious critics who take an active interest in and discuss his/her works;
- then recognition and support of the artist moves to collectors and dealers thus entering into the marketplace;
- the advent of true success and fame with recognition by a wider and general audience.

This road to success is difficult to follow due to the oversupply in the art market. Therefore, in order to emerge among the multitude of artworks present, the artist must be able to get attention to himself and his works. This is not possible only by creating visually beautiful works as it was in the past. For example, think about the contemporary canvases of Alberto Burri or Lucio Fontana, where what really matters is not the aesthetics but the message that the artist wants to convey. In order to stand out, the artist must be innovative in language, creating new styles and elements that are different from previous ones and not mere variations or repetitions. In addition to the works, nowadays, the personality of the artist and his or her communication skills are also fundamental in order to connect with the public in new ways and to be able to provoke in them reactions of astonishment and surprise. For example, the success of contemporary artists such as Banksy or Cattelan is certainly not only based on their artworks, but also on their different ways of relating to the public, one completely hidden and the other in a public and irreverent way. But emergence in the market also depends on other external actors, such as gallerists and merchants.

The art dealers

In the art market, promoting an artist requires a lot of time, effort, knowledge and capital. This activity is carried out by intermediaries who act between the artist and buyers in order to determine the artist's success among the general public.

According to Raymonde Moulin (see Reutter M., 2001, p.123) “the criterion of commitment to the artist marks an important distinction between the mere *art merchant* and the *dealer-entrepreneur*”.

The *art merchant* acts in the primary or secondary market without fully promoting an artist. He presents the artist's works to the general public, placing his own financial success in the first place. This may lead to a convergence of interests with the artist in the short term by increasing the value of his artworks and his earnings, but in the long run the mere economic and financial interest can be easily eroded. What matters is the ability to contribute to the creation of his reputation and image in the market, and this is where the second type of dealers emerge.

The *dealer-entrepreneurs* contribute not only to the economic success of the artist as before, but also to the artistic success. They are mostly present in the primary market looking for young unknown artists who can emerge in the market. They represent intermediaries who, through public relations, are responsible for promoting the artist's image with exhibition shows open to the public, events, catalogs and critics' reviews, adopting an approach similar to the marketing one. Compared to the previous figure, they are more aware of their obligations to the artist, trying to combine both economic and artistic success at the same time.

An art dealer, to be successful in the marketplace and maximize his or her and the artist's reputation and profits, must be able to combine a mix of *artistic*, *psychological* and *entrepreneurial* knowledge. The artistic ones are based on having a sense for aesthetics, knowledge of art and the techniques adopted, as well as being able to create or anticipate art market trends. The psychological ones, on the other hand, are based on being able to convince one's clients and inspire in them the right confidence to buy the work and create in them the right enthusiasm. The entrepreneurial ones are based on the risk of this promotion process, which, because it is slow and long-term, requires a quite substantial initial capital, with the risk of losing the resources in case of failure.

This promotion process must be iterative in order to make the artist stay in the minds of clients through repeated activities such as regular shows and expositions, publications, and personal contacts.

Another important skill of the dealer is to determine the right price for the artworks, especially in the case of a young artist who appears in the market for the first time. These prices “have to be fixed according to the general state of the art market, should reflect the seller's estimation of the quality and should provide a certain security for the buyer's investment” (Reutter M., 2001, p. 127).

That's why in the case of new artists, prices are kept low initially to give the right input for customers to buy, and not too high because of the risk of a possible future collapse resulting in the loss of even their own customers.

They must be fair, reflecting what the market and clients think is appropriate, without being either too low, because the public often tends to measure the value of an artwork by its price, or too high, because over time works may be sold through other channels where there is not full control and where the so-called “moment of truth for the artist and his dealers emerges; it will show whether the prices were fixed adequately and whether a certain market for an artist exists” (Reutter M., 2001, p.127)

To conclude, prices must be properly managed not only at the beginning, but throughout the entire life of the artwork. And during their lifetime, other important players emerge, like auction houses and art fairs.

The auction houses and art fairs

“Works of art typically are sold via what is known as an English auction, where the price is raised until only a single bidder remains” (Heilbrun James, 2001, p.172).

The auction houses are assuming an increasingly important role in the art market nowadays, allowing through streaming and mobile-optimized applications for anyone anywhere to take part in the game. They are mainly active in the secondary market, determining and consolidating artists' quotations in a public and official manner over time.

Their profit is mainly based on an auction fee that is charged to both the seller and the buyer and is around 20-25% of the hammered price, increased by an additional 1-2% in the case of purchase through the online streaming platform.

For this reason, the goal of auctioneers, unlike gallerists and dealers, is not as much to promote the artist's work as it is to maximize the listing of the asset in order to maximize the profit made from the auction through commissions.

Among the world's most famous auction houses, the British auction houses Christie's and Sotheby's emerge most prominently, and their long-established power has led to a growth in revenues that now stand at several billions of dollars.

Other players in the art system include the art fairs, which have developed more recently than the auction houses and are active as a place for the buying and selling of artworks exhibited by dealers, gallerists and artists.

They take place in certain cities that over time have become famous for these events, for example in Italy one of the most popular for buying and selling art, antiques and modern art is certainly the Fiera di Parma, which takes place twice a year with one edition in the spring and one in the autumn, and for contemporary and modern art the Miart in Milan, which takes place once a year during April.

The fairs allow the actors participating in them not only a purely commercial function (buying and selling) but also to expand their relationships, discover and understand market trends, tastes and value of individual artists and works.

Their length is limited to the few days or weeks during which individual stands and pavilions are set up, usually divided by theme (ex. antiques, modern art, contemporary art, etc.), and the access is open to all, allowing art to be more accessible and ensuring the chance to make a good deal.

The museums and art biennials

Art Museums “own art collections and exhibit them to the public on a regular basis: the physical collections and the interaction between these collections and visitors are the defining characteristics” (O'Hagan, J., 1998, p.197).

Their collections, their primary resource material without which museums would cease to exist, arise from the acquisitions made over the years by the museum itself or from donations by local noble families. These artworks are then acquired, studied, preserved, interpreted and finally exhibited to the public so that both present and future generations can benefit from them. This is the basis of the educational function that is transmitted both to the people who decide to enter the museum and to those who are not physically present but access it through the use of multiple digital tools.

A central role in the development of contemporary art along with museums is played by Biennales, whose extraordinary proliferation around the world (there are more than a hundred) is due to the political, economic and cultural changes driven by globalization.

The term biennial is derived from the Latin word “biennium” to identify the two-year period between exhibitions but can also occur over a three- or four-year period (triennial, four-year..).

“The oldest, Venice Biennale, was first held in 1895, São Paulo followed in 1951 and a few more during the next three decades, the majority in Europe (Documenta in 1955, Paris in 1959, etc.)” (Montero G., 2012, p.13).

Created by governments, entrepreneurs, cultural organizations and nonprofit groups, they combine art, education and entertainment, promoting the urban and tourism development of the cities in which they are hosted.

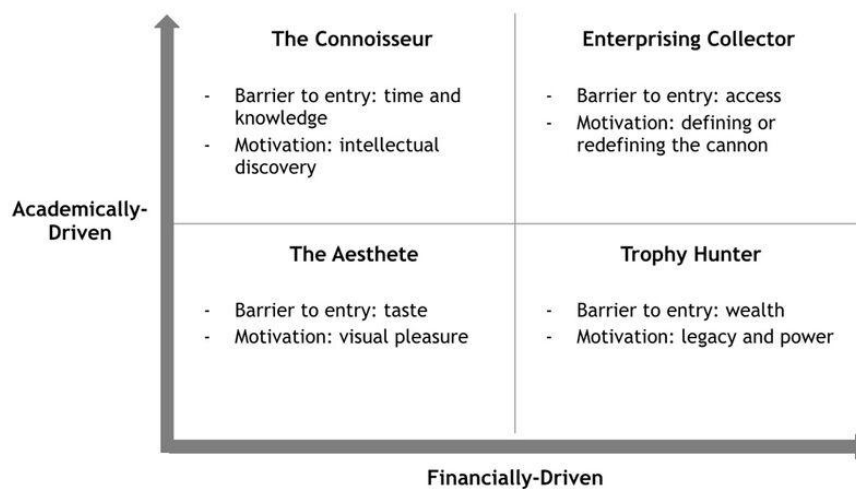
These events differ from each other in terms of size, purpose, structures and themes covered, such as the two Venice Biennales, one dedicated to art and the other to architecture.

The art collectors

According to Hagtvedt et al. (see Leavell, 2016, p.118) “art buyers are any consumers acquiring what they perceive to be art. Art can be purchased for different reasons, for personal pleasure, for investment, for prestige, for collecting, etc.

In particular, analyzing the collector's figure, Evan Beard (2014) identifies and describes four types of art collectors based on their behaviors, strengths and weaknesses, and motivations for seeking and purchasing artworks.

Figure 8. The four types of art collectors



Source: Beard, E., 2018. The four types of art collectors. Artsy [online], 1 (1).

The Enterprising Collector is made up by a group of dynamic people, mostly connected to the contemporary art market, open to the new and to experimentation who buy the art they think will count in the future. Their purpose is thus to challenge tradition and the old to redefine art history, all in the most profound secrecy. This group is closed and there is a strong competition to gain access, so ownership of the right painting is an indication of status for them, and positioning oneself within their collections can be a source of legitimacy and recognition in the art scene for a young artist.

The Connoisseur is an intellectual in the art market who purchases works methodically and independently from the accepted taste. He relies on the opinion of a few experts, and their knowledge, arising from a particular event, is developed over time through continuous study and devotion to art.

The Trophy Hunter belongs to a group of wealthy people in which making money is easy, but what really matters is on what it is spent. Their pleasure comes not so much from the artwork

itself but from the way they have searched, found, bargained and acquired it. They acquire very voraciously and for them acquisition is an end in itself.

The Aesthete is an isolated figure, unconscious of belonging to the category of collectors, who see art as an end in itself and an extension of their being. The most obvious example for the Italian scene is surely D'Annunzio, who during his lifetime created the Vittoriale degli Italiani. They have an innate eye for the beauty in their surroundings and seek to capture the moment. They are often surrounded by a multitude of objects that transport you to exotic places, they are excellent synthesizers of information with an advanced level of taste, and they have a deep sensitivity.

In economic terms, art, in addition to a good of purely aesthetic value, can also be regarded as a capital good from which we derive a certain monetary return. In this case the buyer does not act as a mere *collector* but as an *investor*, and for him the works become something easily replaceable. In the next section we will discuss this new concept that sees art as a form of alternative asset investment.

3.3 Art as an investment

The trend of looking for alternative investments to improve the returns of financial portfolios has led over the years to consider artistic pieces among the various assets in which one can invest.

From being simply a safe haven asset, artworks have over time become real investments through which profits can be generated thanks not only to their high returns but also to their low correlation with the stock market, although they are not without risks related to the excessive volatility and the difficult liquidity of the investment.

The growing demand for art investments is undoubtedly also linked to the globalization and widening of the boundaries of the art market, which thanks to the new technologies and digitalization has made it possible to reach and create an ever larger and wider network of actors and intermediaries, contributing to its maturity.

Art therefore presents not only an aesthetic but also a financial value, characterized by a growing demand but a limited supply (somewhat like luxury goods) and for this reason it results to be a risky investment on which to bet a future appreciation.

“Assets are grouped together based on their characteristics of their underlying companies; just as in managing traditional assets, art is grouped based on the period in which it was made, the artist (whether they are living or dead), style and medium” (Mamarbachi, 2008, p.5).

One of the reasons for investing in art in addition to the high returns appears to be the low or negative correlation with other financial instruments that enable more profitable portfolios even in times of financial crisis.

This form of investment in addition to having numerous benefits in terms of taxation, and so a useful tool for large companies and multinational corporations, also allows for psychological and emotional benefits that other assets cannot convey.

Unfortunately, however, there are also some negative aspects to think about.

This investment is characterized by a low liquidity because an artistic product is more difficult to sell as quickly as any other financial asset, and also a lack of transparency of information and price performance.

The prices and value of works also appears to be subjective and heterogeneous because each piece is unique, conditioned by subjective and emotional aspects and related to the condition of the artwork, its uniqueness in the market and the artist's history.

Transaction costs are often not transparent and include fees related to commissions, transportation, storage, and taxes, and therefore knowledge and experience in the art field is necessary in order to understand the quality and authenticity of the work.

For this reason, to solve these market problems and inefficiencies, specialized art funds have been established to manage the purchase of artworks and access information and expertise not easily available to individuals in the market.

These art fund managers offer according to Mamarbachi et al. (2008) the following benefits and costs:

- Access to art expertise and insider knowledge of the art market;
- Low transaction costs if you are an investor in the fund;
- Good advisory and diligence services;
- Access to co-investment;
- Diversification benefits for the portfolio;
- Fixed exit strategies;
- Lack of personal involvement with art.

These managers through their knowledge are able to estimate the price, era, artist and quality of works to invest in, monitoring their market performance based on some indexes (ex. Mei&Moses) or results in major international auctions (ex. ArtPrice).

Therefore there are, as we have seen, two types of investment in art: the *direct* through the material purchase of a particular artwork and the *indirect* by investing in specialized art funds.

The latter then seek to solve some of the problems presented by direct investments, such as the long-term time horizon and the low liquidity of the investment.

Nevertheless, while the “financial goals of investment are characteristic of indirect investments in art (like in the case of investing in securities); however, with respect to direct investing in art, non-financial goals of different kinds (social, psychological) may play greater role than goals of purely financial nature” (Bialynicka, 2021, p.10).

These psychological aspects, mostly related to the prestige and social status, to aesthetic pleasure and self-esteem, should not be neglected but, on the contrary, they contribute to increasing the value of the artwork and represent benefits that no single share or stock can convey.

3.4 The current situation in the art market

Despite the persistent climate of uncertainty related to the evolution of the multiple variants of the pandemic, the restrictive measures applied by central governments to contain contagions, and the effectiveness of vaccination campaigns, the art market recorded positive performances above all expectations.

This was made possible thanks to the digital strategies and tools applied by the various operators in synergy with the return to “in-person” events, helping to expand the customer base and return to the pre-COVID revenue levels.

In this new scenario in which new customers and new generations (Millennials, Generation Z) are emerging, in which new digital business models and new payment methods have been developed, two important economic plans, the Next Generation EU and the PNRR are introduced in Europe and Italy to accelerate and contribute to the growth of art and culture.

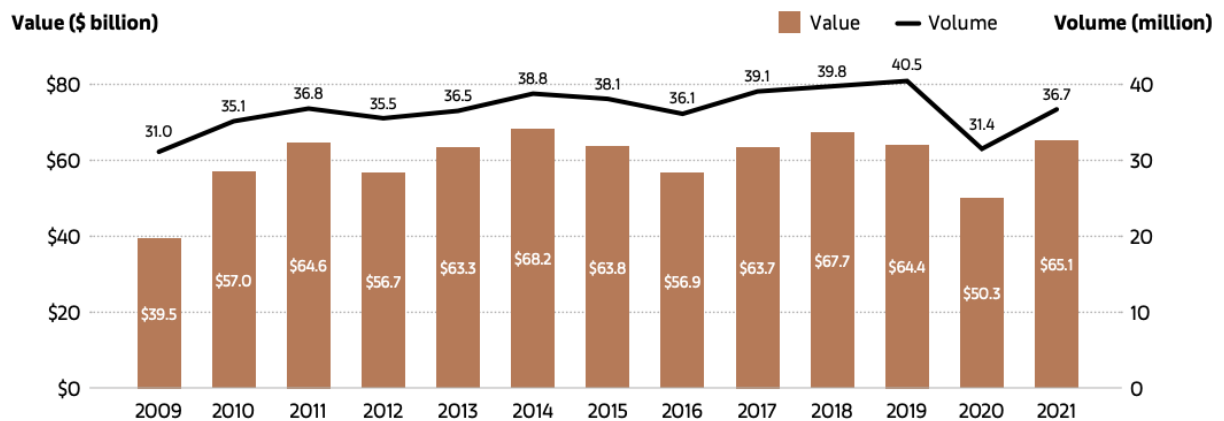
Within this section we will then analyze the current situation at the international level of the art market, the results achieved by the main world squares and operators in the sector (dealers, auctions, collectors), as well as the expected future trends.

Compared to what happened during the 2020 where restrictions contributed to a contraction of the aggregate sales of art and antiques by dealers and auction houses by 22% reaching \$50.3 billions, 2021 saw a 29% growth in sales, reaching \$65.1 billions and surpassing the pre-Covid values of 2019 (Art Basel & UBS, 2022).

As we can clearly see in Image 9, before 2020 the worst recession was during 2009 (U.S. Subprime mortgage crisis) when sales collapsed by 36% reaching \$39.5 billions before recovering during the 2010 and reaching in 2011 \$64.5 billions of sales thanks to the growth

of the Chinese market and the measures implemented by the Fed to lower rates and fight the economic crisis. The peak in performance was reached in 2014 with \$68.2 billions of sales and then remained more or less unchanged until now.

Figure 9. Sales in the Global Art Market 2009-2021



Source: The Art Market 2022 - Art Basel & UBS Report - p.25

Among the major art marketplaces internationally, the leading position is held by the U.S. market with 43% of global sales by value.

In second place stands the Chinese market with 20% while the third place is covered by the United Kingdom with 17%, after being equal with the Chinese market during 2020 falling by 3% in a single year.

After a significant drop in 2020, the French market in 2021 holds the fourth position after gaining ground by advancing 1% to 7%.

The rest of global sales in value terms are respectively contended by Germany (2%), Switzerland (2%), Spain (1%) and the rest of the world with 8% (Art Basel & UBS, 2022).

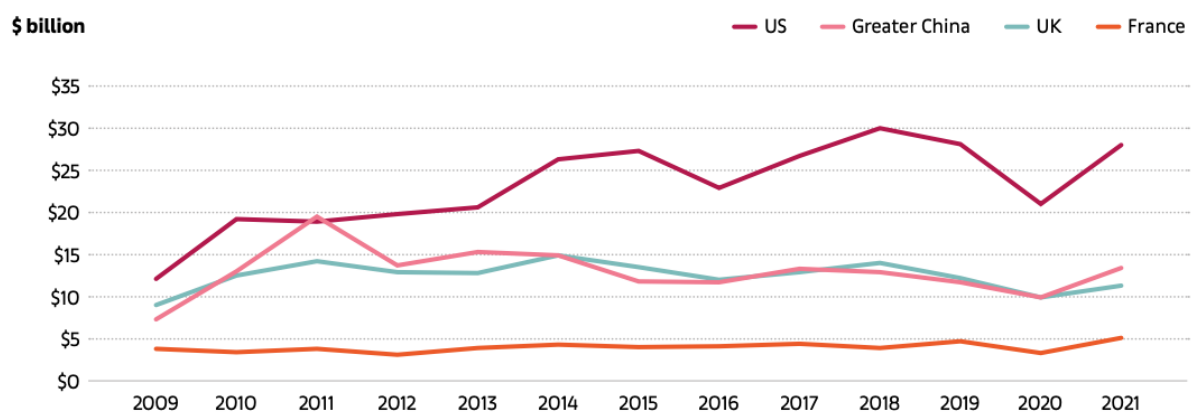
Looking more in detail at the values of sales in the top four global markets from 2009 to 2021 (Image 10), the U.S. market after a 24% drop in value in 2020 recovered during 2021 reaching \$28.0 billions of sales. Previously, this market led the growth globally from 2010 until 2016, where it collapsed by 16% and then peaked during 2018 with \$30 billions of sales. Analyzing the Chinese market, this after experiencing a 12% drop in sales to \$9.9 billions in 2020, had a significant growth of 35% to \$13.4 billions in 2021, surpassing the British market in the global ranking, partly due to the strengthening of the yuan against the dollar and the development of the infrastructure in the artistic market. In the previous years, there had been a head-to-head competition between these two markets, where the Chinese market, thanks to a

strong domestic growth, had occupied the second place from 2010 to 2014, peaking during 2011 at \$20 billions.

The U.K. market in recent years has faced not only the pandemic but also the impact of Brexit since the beginning of 2021, with additional charges and tariffs applied to all imports from the EU. After a decline in sales in 2019 and 2020, during 2021 these increased by 14% to \$11.3 billions, but remained lower than in 2019 (\$12.2 billions), making Britain fall to third place in the global ranking.

After a decline of more than 30% in 2020, sales in the French market experienced a particularly strong growth in 2021, with a 50% increase in value over the previous year to \$4.7 billions, bringing the market to 5%, above the 2019 level and at its highest point in 10 years (Art Basel & UBS Report, 2022).

Figure 10. Sales in the Major Art Markets 2009-2021



Source: The Art Market 2022 - Art Basel & UBS Report - p.30

Moving on to analyze in more detail the situation in the art market as seen by its major players, after suffering a 20% drop in sales during 2020, dealers reached \$34.7 billions in sales in 2021, increasing by 18% on an annual basis but still remaining below the pre-Covid level of 2019.

In particular, by segmenting dealers according to their sales levels, it can be clearly seen in Image 11 how the largest dealers, which experienced the largest average sales decline in 2020, performed the best.

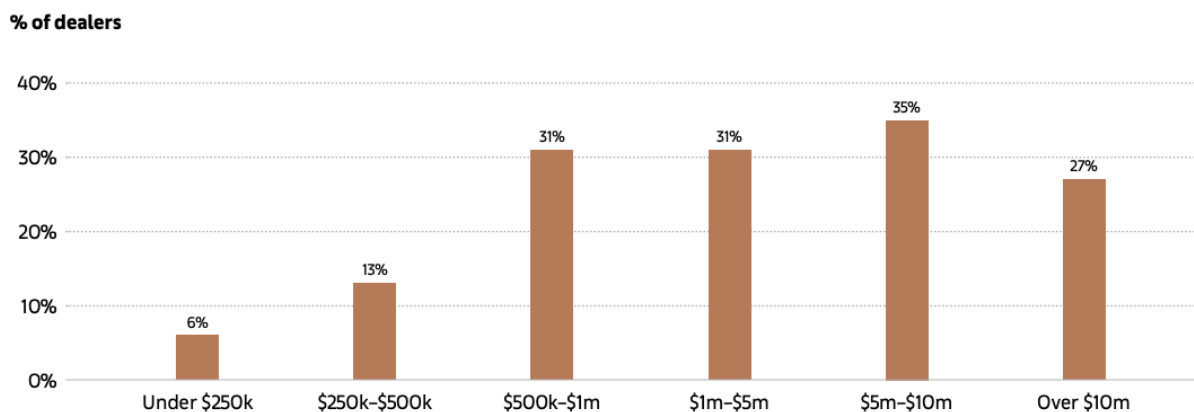
The best performance from the previous year is in the dealer segment with sales between \$5 millions and \$10 millions (35%) compared to the nearly 30% decline in 2020.

In contrast, medium-sized dealers, with sales between \$250,000 millions and \$500,000 millions, recorded a 13% increase in sales after a 26% decline in 2020.

At the highest end (dealers billing \$10 millions or more), sales increased by 27% overall, a significant progress after experiencing one of the largest declines of 31% in 2020.

The smallest gains, on the other hand, were recorded by dealers with sales below \$250,000, with an increase in values of just 6% (Art Basel & UBS Report, 2022).

Figure 11. Average Change in Sales Values by Dealer Turnover Segment 2020-2021



Source: The Art Market 2022 - Art Basel & UBS Report - p.69

The second player analyzed is the auction sector, dominated by Christie's, Sotheby's and Phillips, which, after a difficult year in 2020, experienced a strong recovery in 2021, thanks to sales through both online and offline channels and an influx of new young buyers.

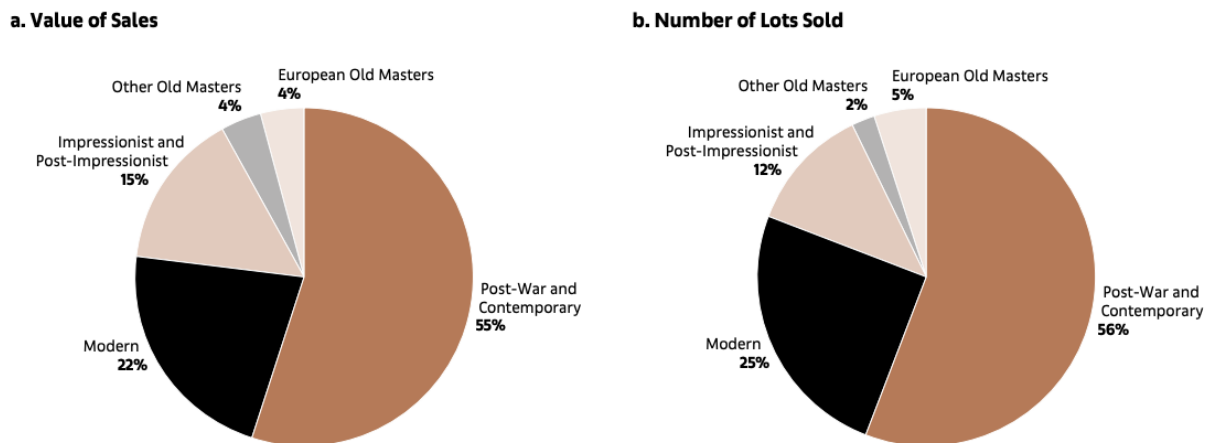
Analyzing more in detail, their sales are dominated by the Fine Art Sectors which can be divided according to a chronological criterion of the artists' date of birth:

- Post-War and Contemporary, defined as artists born after 1910;
- Modern, defined as artists born between 1875 and 1910;
- Impressionist and Post-Impressionist, defined as artists born between 1821 and 1874;
- Old Masters and European Old Masters, defined as artists born between 1250 and 1821.

Analyzing Image 12, we can see that Post-War and Contemporary art maintained the first position of the market in 2021, with a 55% share of the value of global Fine Art auction sales. Modern art ranked second in value of the Fine Art auction market in 2021, with a 22% share. Impressionist and post-impressionist art sales accounted for 15% of the value of sales in the fine art auction market.

The Old Masters sector accounted for 8% of the value of Fine Art auction sales worldwide, of which 4% is represented by European Old Master sales.

Figure 12. Market Share by Sector of the Fine Art Auction Market in 2021



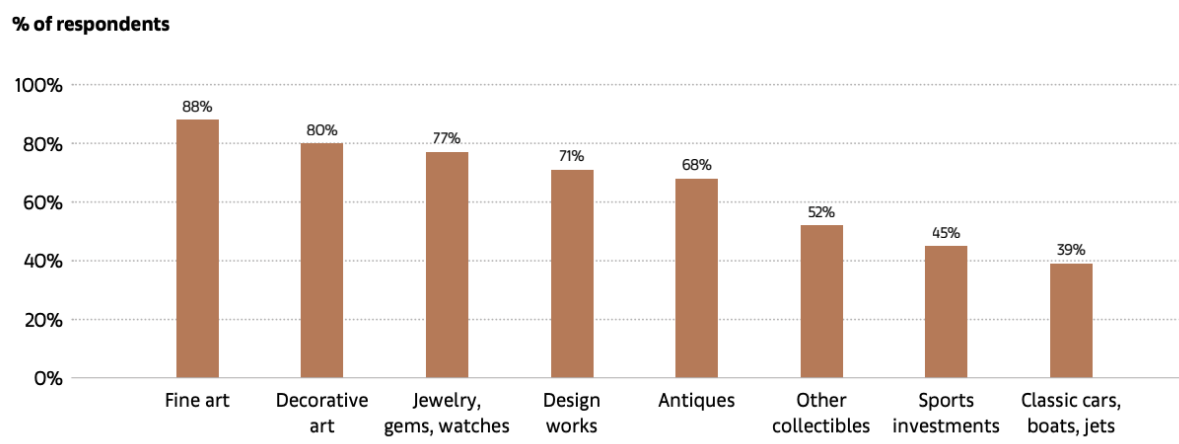
Source: The Art Market 2022 - Art Basel & UBS Report - p.220

The last step of analysis is represented by collectors, whose spending on art increased substantially by 2021 due to a growth in the level of wealth and assets held by millionaires around the world.

Specifically looking at Image 13, their spending in 2021 was concentrated on Fine Art (88%), Decorative Art (80%) and Antiques (68%). Relative to collectibles, their purchase focused mainly on the jewelry, gems and watches market (77%) and design works (71%).

Closing the ranking are Other collectibles (52%) such as numismatics, philately, Wine and Spirits, as well as Classic Cars (39%)

Figure 13. Share of Collectors Having Purchased Art and Collectibles in 2020-2021



Source: The Art Market 2022 - Art Basel & UBS Report - p.263

In conclusion, the current economic and social scenario is characterized by new and unpredictable challenges that can be addressed in the art market through the use of new and modern tools. Some examples are provided by the recent pandemic crisis generated by COVID-19 where, due to government lockdowns and health restrictions, many companies in this sector were forced to suspend or close their operations. Another example is provided by the current war crisis in Europe triggered by Russia's invasion of Ukrainian territory, where economic sanctions, the closure of activities in the two territories and the blocking of trade in these countries, is having a heavy boomerang impact from an economic point of view in the European art market. From this ever-changing scenario emerges a polarization in the international art landscape, where the more advanced and digitalized players have found themselves at a competitive advantage in dealing with the impact of these unexpected events compared to the more traditional players who are less open to innovation in this sector.

In fact, by analyzing the offerings of these economic actors, some trends emerge that enabled them to overcome the pandemic crisis and will enable them to overcome other future crises. These include the digitalization of artistic offerings with the creation of new platforms and multichannel formats (online and offline) such as auctions where the auctioneer is physically present in the hall and connected via streaming. A greater transparency of information due to the rapid spread of online and advanced technologies emerged, in addition to the growth of the NFT, Digital art and Crypto-art auction market capable of attracting a new younger audience of Millennials. The audience in recent years, thanks to the increasing digitalization of the sector, has led to a decrease in the average age of buyers and the entry into the market of new young buyers under 40 who have driven the recovery of the industry. Two other themes that come up are also the creation of greater inclusion and openness to diversity in the art world, which thanks to digitalization has seen the opening of new channels around the world with access to supply even in less developed countries, and the growing interest in the collectibles and luxury sector, which has further expanded its audience.

As one can well understand from these new trends, the pandemic has had numerous repercussions in this sector, not only negatively but also positively, and within a fairly limited time frame the changes in terms of digital evolution have been remarkable and in another non-emergency context would have required much more time. For this reason, the analysis of this sector continues in the next chapter where the meeting of the two previously discussed macro-themes of art and digital will be discussed, and how the latter has led a traditional market such as art to evolve in order to adapt to the new economic and social landscape and become more resilient.

4. Digital transformation and innovation in the art market

As described in the introduction of the thesis, this chapter will analyze the convergence of the two main themes previously analyzed, the digital transformation and the art market.

The advent of new digital technologies has expanded access to a new audience of buyers, younger and more multicultural than in the past, changing the habits of a traditional sector such as the art.

Digitalization has changed the way art is made by the artist and the knowledge needed by the artist in the creation process, primarily the computing and communication knowledge. Especially in recent years, the methods adopted by different market players to display artworks have changed, think of the use of viewers to immerse oneself inside a digital artwork, as well as the buying and selling processes and payment methods adopted, which are more remote and secure than in the past.

This has led to an expansion of sales and supply of the art product, as well as growth of the entire sector, but also to a risk of commodification and financialization of art.

Having made this due introduction, in this chapter we will describe in detail how digitalization has been applied to this traditional sector. First of all, technologies have changed the way art is realized and the restoration process adopted for the antique artworks. Social media has also changed the promotional campaign of the different actors in the sector (museums, fairs, galleries..) to the global community and the sales channels with the advent of online marketplace and platform have evolved to meet the new needs of an increasingly connected and multichannel customer community. The chapter concludes with a presentation of the current digital situation in the art sector after the Covid-19 pandemic crisis, based on two reports, the Hiscox Online Art Trade Report 2021 and the Art Basel & UBS Report 2022.

4.1 Digitalization of the artworks

4.1.1 Digital and Crypto Art

The term *Digital Art* (or *Computer Art*) refers to the use of digital technologies as a means by the artist to realize an artwork that “implies that the work is produced, stored, and presented in

digital format and makes use of the inherent possibilities of the medium” (Paul, C., 2002, p. 472).

Contrary to what one may imagine, the origin of this form of art can be traced back to the 1950s-60s with the birth of the first computers and began to grow and develop from the 1980s when they became an accessible and democratic technology.

Banally, we could describe this art form as the evolution of the traditional process of creating artwork. Here the artist instead of using a canvas stands in front of a computer screen, and instead of a paintbrush uses a mouse, a graphics tablet, a scanner and professional software to process images, photos, drawings and videos digitally.

According to Christiane Paul (2002), this digital medium has changed the traditional characteristics of artwork, audience and artist, and presents the following attributes:

- it is *interactive* and allows forms of navigating, assembling or contributing to the artwork that go beyond its experience;
- it is *dynamic* and responds to the changing and real-time data transmission;
- it is *collaborative* and *participatory*, based on multi-user input;
- it is *customizable* and *adaptable* to the single user's needs or remote and immediate intervention.

These advantages of the digital medium are also reflected in the artwork, which allows it to overcome the limitations of traditional art. Obviously, there is no direct competition between these two forms of art, which are not mutually exclusive but travel on parallel paths.

In particular, digital art allows the use of means without any limitations, such as the possibility of reaching any shade of color in the artwork and resolving any kind of error simply by going backwards.

Another feature is durability, as a digital work, properly preserved and secured from hackers, has no problem related to fear of sunlight, air, weather and other possible incidents.

Digital art is also affordable and the barriers to entry are very low, because you simply need to own a PC or tablet and start to practice creating your first artwork, and the costs of making it are much lower (no paint, paper, canvases and color).

Digital tools are constantly evolving and developing, allowing for visual improvement of artworks over time that can achieve perfection and always adding new and different ways with which to manipulate one's works, not only with professional and expensive software, but also with simple and open-source platforms. Of course, also this form of art has some disadvantages, such as the strong competition in the sector (given indeed by the low barriers to entry), which makes it more difficult for the artist to stand out in the context.

The artwork turns out to be colder, monotonous and above all intangible, taking away from the material satisfaction that can be gained by simply touching one's work.

But more importantly, one of the reasons this art form has evolved in recent years is the lack of status as a valuable work of art to be collected, due to its immateriality, easy reproducibility (resulting in unauthorized distribution of the artwork) and the impossibility of owning, collecting and establishing its authenticity in a safe manner.

To solve these problems, Blockchain technology has come to the rescue with the subsequent emergence of the so-called *Crypto Art* (or *NFT Art*).

Differently from Digital Art, the *Crypto Art* “is a recent artistic movement in which the artist produces works of art, typically still or animated images, and distributes them via a crypto art gallery or their own digital channel using blockchain technology” (Franceschet et al., 2021, p. 402).

This art form experienced particular success during 2021, particularly when Metakavan (pseudonym of the founder of Metapurse, the world's largest NFT fund) acquired for \$69.3 million the digital work “Everydays: the First 5000 Days”¹. It represents a monumental Jpg file created by Beeple, (pseudonym of Mike Winkelmann, a 39-year-old illustrator from Wisconsin), containing a collage of 5,000 images created and posted from 2007 to 2021 that incorporates surreal scenes and drawings of politicians beside cartoon characters. The artwork was sold by Christie's auction house, which sold a work without a physical component for the first time in its 255-year history, accepting bids in Ethereum.

This Crypto Art system is based on the creation of a digital artwork by the artist, which is then uploaded to a specific online sales platform through a transaction on, for example, the Ethereum blockchain, associating to each artwork an NFT (Not Fungible Token). The NFT “is a unit of data stored on a blockchain that certifies a digital asset to be unique and therefore not interchangeable, while offering a unique digital certificate of ownership for the NFT. More broadly, an NFT allows to establish the provenance of the assigned digital object, offering indisputable answers to such questions as who owns, previously owned and created the NFT, as well as which of the many copies is the original. Several types of digital objects can be associated to an NFT including photos, videos, and audio” (Nadini et al., 2021, p. 1).

This NFT is then added to the artist's cryptographic wallet. When the asset is sold, this token corresponding to the artwork is transferred directly to the buyer's wallet, while the price paid in the cryptocurrency used (ex. Ether, Bitcoin) is transferred to the seller's wallet.

¹ Sol, P., 2021. Christie's debutta nelle criptovalute: con 69,3 milioni di dollari è record per l'arte digitale. Il Sole 24 Ore [online], 1 (1). Available at: <<https://www.ilsole24ore.com/art/christie-s-debutta-criptovalute-693-milioni-dollari-e-record-l-arte-digitale-ADwogoPB>>

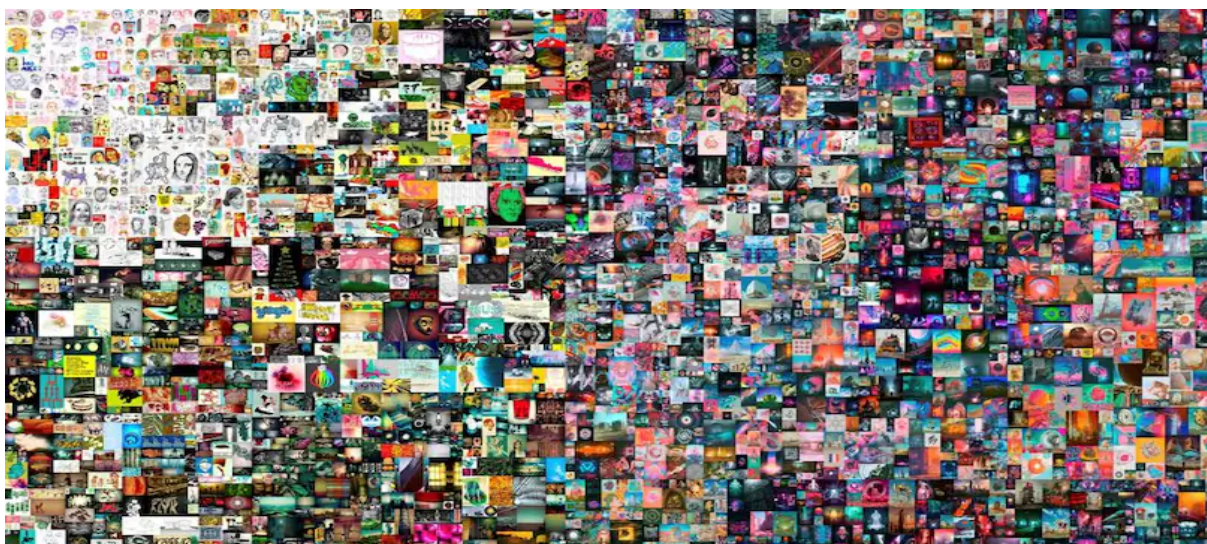
As we can understand, Crypto Art makes it possible to guarantee the uniqueness of the work, thanks to the uniquely and immutably associated token, and to certify the authenticity and paternity of the artwork. This protects not only the buyers but also the artists, eliminating the risk of imitation and plagiarism of their artworks. Blockchain technology also ensures that the distribution of the artwork is controlled in the secondary market, eliminating risks associated with lawful provenance and the costs of finding their original creator and buyers.

However, this art form is not without its risks and dangers. The first is that, since it is still an immature market, many people improvise themselves as artists creating artworks of dubious or no artistic value. Added to this there are buyers and speculators who try to buy and resell NFT at a higher price, contributing to a speculative bubble in this market, already very volatile due to its association with the value of cryptocurrencies, that can go up and fall down overnight.

Other problems are associated with the technology used, which appears to be unsustainable due to the high electricity consumption to maintain the Blockchain, as it requires the continuous work of multiple high-performance processors.

In conclusion, Blockchain is enhancing today's digital art scene, and while it has not only benefits but also considerable costs, there is a need to invest in it in order to overcome these barriers and make it an imperative of today and future art.

Figure 14. “Everydays: the First 5000 Days” - Beeple



Source: Sol, P., 2021. Christie's debutta nelle criptovalute: con 69,3 milioni di dollari è record per l'arte digitale. Il Sole 24 Ore [online], 1 (1).

4.1.2 Technologies at the service of Art

The AI Art

Although this is not a real technology, but a branch of computer science that deals with the programming of hardware and software systems to equip machines with certain human characteristics (like creativity), the AI (*Artificial Intelligence*) over time has also been used for the creation of artworks.

AI art represents an art form born from the collaboration between AI algorithms and human artists and one of the early pioneers was the “artist Harold Cohen, who wrote the program AARON in 1973 to produce drawings that followed a set of rules he had created” (Little-Tetteh and Shchylhelska, 2019, p. 73).

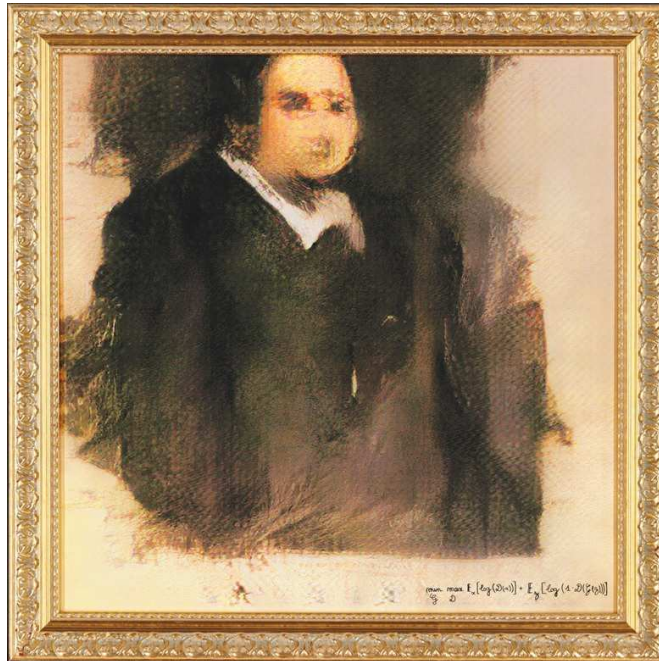
Over time, several technological advancements have been achieved and have increased the interest in AI Art, through the development of many algorithms for creating and editing images in an artistic manner. In particular, according to Cetinic and She (2022) there are some important technological milestones that influenced AI Art production:

- *Generative Adversarial Network* (2014), a method that brought impressive and convincing results, based on training two “competing” models: a generator with the goal of capturing the distribution of true examples of the input sample and generate realistic images, and a discriminator to classify the generated images as fake and the real images from the original sample as real.
- *DeepDreams* (2015), a method initially designed to advance the interpretability of deep convolutional neural networks with the display of patterns that activate the neurons. This method led to the production of psychedelic and hallucinatory stylistic effects, becoming a new form of digital art production.
- *Neural Style Transfer* (2016), a method for the creation of stylized images by separating and combining the image “content” (the recognizable figures that are depicted in an image) and “style” (an aesthetically visual deviation from the photorealistic depiction of content). These stylized images unfortunately represent merely an obvious combination of inputs and not a unique and novel artistic creation.
- *Artificial Intelligence Creative Adversarial Network* (2017), represents a step forward from the GAN model, which can generate images that resemble existing art and produce nothing really new. Through some modifications, it allows the network to generate creative art by maximizing deviation from established styles while remaining

within the distribution of art, making it impossible for people to distinguish these images from those produced by a human artist.

- *DALL·E* (2021), a model that creates images from text captions for a wide range of concepts expressible in natural language. These advanced text-to-image synthesis models will represent an important trend in the future of AI Art.

Figure 15. “Portrait of Edmond Belamy” - Obvious



Source: Kinsella, E., 2018. The First AI-Generated Portrait Ever Sold at Auction Shatters Expectations, Fetching \$432,500—43 Times Its Estimate. Artnet [online], 1 (1).

Particular attention to this art form emerged since October 2018, when the world's first AI artwork, “Portrait of Edmond Belamy” was sold at an auction by Christie’s for \$432,500². The portrait (slightly shifted to the northwest) depicts a french gentleman and appears unfinished as facial features appear indistinct and white areas are present on the canvas.

The work is signed in the lower right-hand corner, where the formula for the algorithm used by Obvious, a Paris-based collective composed of Hugo Caselles-Dupré, Pierre Fautrel and Gauthier Vernier, is located.

This artwork was created using the GAN method, feeding the system with a dataset of 15,000 portraits painted between the 14th and 20th centuries from which the Generator creates a new

² Kinsella, E., 2018. The First AI-Generated Portrait Ever Sold at Auction Shatters Expectations, Fetching \$432,500—43 Times Its Estimate. Artnet [online], 1 (1). Available at: <<https://news.artnet.com/market/first-ever-artificial-intelligence-portrait-painting-sells-at-christies-1379902>>

image while the Discriminator detects the difference between a human-created image and one created by the Generator.

The question that arises here is: who is the real artist? The machine that created the artwork or the human being who holds the final vision and controls the algorithm?

On the one hand it is the machine that, through a process of generation and discrimination, creates the final artwork, on the other hand it is the man who wrote the algorithm and set the parameters to make it.

We can resolve this question if we see this relationship between humans and algorithms as a kind of collaboration. Unlike a simple tool such as a printer, here the algorithm possesses a certain autonomy and operates at least partially independently, always under the humans control and supervision.

However, it seems clear that this technology over the years will become more and more important, the algorithms even more complex, and with them we will be able to bring to life innovative and radically new forms of art.

AR & VR Art

Augmented (AR) and Virtual reality (VR) have been successfully applied in different fields, among them art, particularly in the way artworks are created but especially enjoyed by the public. As was described in the first chapter, while Augmented Reality allows digital elements to be projected into a real space by enriching it with images, objects and information, Virtual Reality, through the use of special viewers, allows the user to enter a completely digital world. According to Modena et al. (2021), while following different paths (one to a digital world and the other real), these two distinct technologies and environments share some common properties:

- *Unframedness*, because both for VR as well as for AR, there is a process of “environmentalization” of the image. The image trespasses its boundaries and either replaces reality (total substitution of the real world by the iconic world where the visual field is saturated with images) or incorporates itself into it (integration between the real and the iconic world where I can interact both with iconic and actual objects within my peripersonal space-time).
- *Presentness*, characterized by the double and correlated sense of the user presence in the iconic world (where he/she becomes a multisensory experiencer than a passive observer) and the presence of virtual objects in the actual world.

- *Immediateness*, this property is related to the dual status of iconic images as both means and media, hiding that they are mediated thanks to technologically sophisticated strategies.

The relationship between Augmented and Virtual Reality and the world of art is represented by the evolution in the experience of artworks within museums.

Offering these two technologies to visitors allows them to convey information, emotions and experiences in an innovative way, increasing their attractiveness, especially to younger generations.

The artworks, thanks to AR, are enriched with additional information and interactive content through the connection with smartphones and tablets. This dialogue allows visitors to become more involved and active, extending the memory of their experience and engaging other potential visitors.

AR art makes the artistic experience as a collaboration between art and artist, giving the spectator the ability to “place” artworks anywhere and to be able to manipulate the 3D elements of the composition.

An example of AR art is “Interplay: Art Play for All” created by Adana Tillman in collaboration with Ohio's Akron Art Museum³. The opera was conceived as a manifestation of love to the Akron city, including local places of interest as seen from the artist's point of view. Adana placed collage-style posters throughout the city with QR codes to scan.

When these QR codes are scanned, human figures, abstract shapes and more are displayed and the spectators with their mobile devices can move and edit the different components of the artworks by adding new elements and changing their color.

Instead, through the use of VR in the artworks, the visitor is transported into an immersive experience involving all the senses, inside an alternative world made of space, depth, people and life. The viewer, wearing the classic visor, enters directly into the artwork in 360 degrees, so the representation is no longer frontally visible as a painting of the past, but walkable with the possibility of experiencing firsthand what the artist has experienced and wants to convey.

³ Akron, 2020. Akron Art Museum Launches Interplay: Art Play for All Augmented Reality Experience. Akron Art Museum [online], 1 (1). Available at: <https://akronartmuseum.org/newsroom/akron-art-museum-launches-interplay-art-play-for-all-augmented-reality-experience/>

Figure 16. “Hyperplanes of Simultaneity” - Fabio Giampietro and Alessio De Vecchi



Source: <https://www.hyperplanesofsimultaneity.com/>

An example of the marriage of VR and painting is the artwork presented in 2016 by artist Fabio Giampietro and collaborator Alessio De Vecchi, titled “Hyperplanes of Simultaneity”. The idea arose from the association between the two different types of artistic expression: the two-dimensional one of painting and the three-dimensional one of Virtual Reality.

The artist portrayed imaginary ideal cities on giant canvases by making an optical cone. Through the use of the visor, the viewer enters a new space in which he/she feels emotionally involved. With Virtual Reality, one discovers details that cannot be noticed in the simple painting and finds oneself in a situation of precarious balance, suspended like a funambulist on the edge of a skyscraper.

The project was very successful worldwide and won the prestigious 2016 “Lumen Prize” as the best digital work, reaching a market value of \$38,000⁴ for the lucky buyer who will be able to live this experience directly in his or her home. Augmented and Virtual Reality, thanks to the rapid spread and enhancement of technologies, are emerging in the art scene, and with them the pleasure of being able to live and experience totally and immersively art.

We are at the beginning of a revolution that may allow the artist to introduce us into his mind and to become a creator of parallel and virtual worlds in the next future.

⁴ Bozzo, G., 2021. VR & NFT: il futuro dell’Arte. Meetcenter [online], 1 (1). Available at: <https://www.meetcenter.it/it/vr-nft-il-futuro-dellarte/>

3D Printed Art

The application of 3D printing, a manufacturing technology used to produce three dimensional prototypes from CAD representations, has made it possible to remove the limits on the artist's creativity in realizing his or her projects.

Working with this additive technology makes it possible to create very complex shapes and geometries with a great level of care and detail and is increasingly being adopted by artists as a tool through which to give space to such complex designs that are otherwise impossible to achieve with traditional production methods or manual processes.

The application of this technology leads to different benefits. As was mentioned earlier, it allows creativity to be supported and the artwork to be reproduced exactly as it was imagined by the artist, without any constraints of the traditional production processes.

The only expertise required is to know how to use online 3D model design software. Added to this there is also the possibility of rapidly modifying the model during its realization, making the necessary changes in the space of a few minutes on the digital project counterpart.

However, even 3D printing is not without some disadvantages. These include, for example, the high costs associated with 3D printer software and hardware, as well as the technical knowledge and specifications required. In addition, because it is not yet a mature technology, it is not possible to use every material but only certain ones.

Anyway, the fact that it is not yet suitable for large-scale production but only in limited numbers still makes it suitable for the art world where different internationally renowned artists adopt it to make their artworks.

One example is Italian artist Dario Santacroce⁵, who decided to challenge Plato's thought about the impossibility of obtaining perfect forms in nature except in one's own mind.

He sought to challenge this belief through his 15 sculptures "Spherical Creations", based on three interlocking spheres that give rise to different figures including the so-called Reuleaux Triangle, as we can see in the figure below.

In the past, his creations were carved on stone, then he switched to adopting glass and ceramics as materials, finally coming to CAD software and additive manufacturing to achieve greater precision, using pure silica sand and a very small amount of binder.

⁵ Parker, M. A., 2016. 'Spherical Creations': Artist Dario Santacroce Creates Amazing 3D Printed Sandstone Sculptures. 3Dprint [online], 1 (1). Available at: <<https://3dprint.com/125539/3d-print-sandstone-sculptures/>>

Figure 17. “Spherical Creations” - Dario Santacroce



Source: Parker, M. A., 2016. ‘Spherical Creations’: Artist Dario Santacroce Creates Amazing 3D Printed Sandstone Sculptures. 3Dprint [online], 1 (1).

But the pioneer in the application of 3D printing in art is surely American artist Joshua Harker⁶ in his series of cast bronze and polyamide sculptures “Tangle”, which combines a traditional material with a technology of the present. These sculptures present a level of compositional complexity unattainable by traditional means, and their development process took the artist two decades of study, culminating in 2004 with the advances made in this new technology. The artist's aim is to shape and share the architecture of the imagination, with surrealistic forms that include vermicular, arabesque and mathematical patterns.

Art throughout history has gone hand in hand with the development of new technologies to overcome its boundaries. In the future, investments in 3D printing will further improve its application and extend its use to new materials. Therefore, artists will follow this development and increasingly introduce this technology in their works.

4.1.3 Not only creation but also conservation and restoration

With the development of new digital technologies and image processing techniques, it is possible to have innovative tools not only for the creation of artworks, but also to deepen

⁶ Finest Shapes, 2014. Joshua Harker. Finest Shapes [online], 1 (1). Available at: <<http://finestshapes.com/joshua-harker/>>

knowledge of the state of existing cultural heritage and to enable their proper conservation and fruition.

There are numerous digital technologies that are applied in the conservation of artworks, “just to name a few examples: photographing objects under normal and raking light to record true colors and surface properties of an artwork; UV fluorescence and IR reflectography, to identify old restorations, varnishes and underdrawings; x-radiography, for studying all the layers of materials; 3D modeling and photogrammetry; using of total stations, for precise GPS positioning; high dynamic range, high resolution (photo-stitching), extended depth of field photography, etc.” (Džikić and Radin, 2019, p. 41).

Digitalization of artworks for their preservation and restoration is increasingly necessary today to create and share new knowledge about existing operas. Masterpieces like all objects are subject to the action of time, but possessing a complete digital record of them is the basis for their correct integrity and preservation. Today's tools make it possible to greatly reduce the time and resources required not only for restoration but also for the study of works, which are instantly available within a data platform. This makes it possible, for example, to reduce the need to have to manipulate the object, reducing the risk of its degradation and the resulting investment in its restoration and conservation. The most sensitive works can then remain in stable low-risk environments, undisturbed except to be exhibited or used in important events or research. This is also complemented by increasingly advanced sensors that allow real-time and highly accurate monitoring of the environmental parameters in which the works are located. In particular, values for temperature, humidity, dust and bacteria that may be the basis over the long term for the degradation of the work. These data provide the basis for further and future studies on the correlation between causes and effects of decay in order to create preventive and predictive degradation models.

Obviously, all of this requires precise planning from scanning the work to its storage within a database that must be adequately protected over time from the risks of hacker attacks and data theft. Procedures must be standardized in order to ensure hardware and software compatibility of the files. This requires significant initial investments that are also decided in relation to the artistic value of the works that are to be protected and that are the basis of a nation's cultural heritage. But its importance for future posterity, justifies these high economical, technological and professional investments.

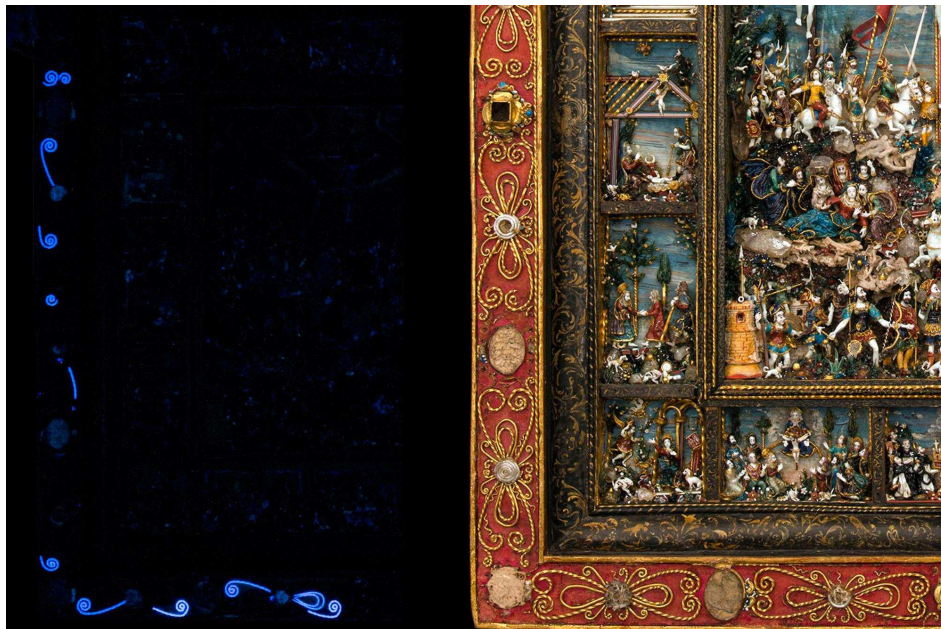
Technologies, in addition to being the basis for collecting easily accessible data about artworks and for their preservation for future generations, are also applied with great results in the restoration processes of a work that is now degraded. Thanks to digitalization, these interventions are implemented with a less invasive approach than in the past, in order to

preserve the originality and authenticity of the work. This also facilitates the intervention of the operator, helping him/her in identifying the problems to be solved, even those invisible to the naked eye, assisting and guiding during the course of the intervention.

Among the technologies previously described, 3D Printing has found particular application in this field, as in the case of Mattia Mercante⁷, a cultural heritage restorer who collaborates with the Opificio delle Pietre Dure Institute in Florence to restore artworks of the greatest figures of the Italian Renaissance. He, after a careful assessment of the intervention to be carried out (urgent restoration or simple prevention) and digital scanning of the work, creates through a 3D Printer the necessary forms for the project.

Among his projects, for example, there is the restoration of the reliquary of the Grand Dukes' Treasure Museum in the Pitti Palace in Florence. At the center of the composition stands the crucifixion of Christ, surrounded by a wooden frame divided into small cells, each representing a scene from the rosary. This frame has intricate glass decorations made of heated sticks twisted to create curls, which due to the complexity and lack of techniques was impossible to restore in the past. But thanks to 3D Printing and gold-colored resin, it was possible to reconstruct the missing parts, which are indistinguishable to the naked eye unless UV light is used.

Figure 18. 3D printing restoration - Reliquary of the Grand Dukes' Treasure Museum



Source: Formlabs, 2018. How 3D Printing Brings Antiquities Back to Life. Formlabs [online],

1 (1).

⁷ Formlabs, 2018. How 3D Printing Brings Antiquities Back to Life. Formlabs [online], 1 (1). Available at: <<https://formlabs.com/blog/how-3d-printing-brings-antiquities-back-to-life/>>

Another famous restoration that used one of the previously described technologies is surely the painting dating from 1642, “The Night Watch” of Rembrandt⁸, located in the Rijksmuseum in the Netherlands. The work in 1715 was moved to the Amsterdam Municipal Hall, but because of its considerable size, panels were cut from the sides and some sections from the top and bottom, which were then lost. In 2019, the museum decided to undertake a restoration project using three tools: the remaining preserved section of the original painting, a 17th-century copy of the original painting attributed to Gerrit Lundens (made before the cuts but with a different size and painting style from the original), and AI Technology. Three neural networks were then created: the first to identify the details shared between the copy and the original, the second to create and adapt the missing details to the different sizes between the original and the copy, and finally the third responsible for selecting the missing parts created by the algorithm that did not have Lundens' style. The reproduction was then printed on canvas and the panels were placed alongside the original to be displayed only temporarily for the respect of the Old Master.

Certainly many purists are against the use of these technologies for the restoration of works of art, because they are made with “artificial” tools and materials and because their defects are due to damage (whether from human or environmental causes) that is the result of normal historical and environmental events or the natural aging process. However, regardless of one's thoughts, these new technologies that are becoming more widespread and accessible will make it possible to save artworks from irreversible damage and to show to future generations the masterpieces as they are available to us today and as they were conceived by their creators in the past.

4.2 Digitalization of the artistic promotion

4.2.1 Social Networks and Influencers for Art

Digitalization and the spread of Social Networks are increasingly influencing multiple sectors of contemporary society. They have changed the ways of interaction with different actors in the market and are no longer considered mere tools for entertainment and recreation, but fundamental tools for the commercial and promotional sphere.

⁸ De Mattei, S. E., 2021. Artificial Intelligence Restores Mutilated Rembrandt Painting ‘The Night Watch’. ARTnews [online], 1 (1). Available at: <<https://www.artnews.com/art-news/news/rembrandt-ai-restoration-1234596736/>>

The artistic environment has also been influenced by this phenomenon, with some changes in the ways of promotion and diffusion of artworks through the use of different platforms.

Social networks, with their simple and attractive interface, allow users to share photos and videos, follow profiles of interesting museums or galleries, and like the content they view. They also offer the possibility to comment and express opinions about artistic content shared by contemporary artists who, through the use of hashtags associated with a given topic, can make their posts go viral and reach millions of users around the world.

“In the past, when artists want to exhibit their works, they have to organize an exhibition with its extensive process. Presently, social media is available and offers a new way to deliver the works to the public instantly, only by posting photos of their works to the social media of their choice, and anyone from across the world will have access to the works” (Rusyada and Sutyono, 2021, p. 30).

Every person, with access to these new media, has the same opportunity to create art or experience art, but more importantly to appreciate and comment on it. Thanks to the smartphone, anyone at any time and place, can view these artworks and share them, increasing the knowledge of the author of the post by the entire community. For this reason, artists, galleries and museums compete in these platforms to attract new audiences and go viral in the network, following the trends of social users and their tastes. This is behind the term originated to express a content that can be shared for example on Instagram, namely “Instagrammable”.

In this scenario, the focus of art in social media has changed: “art is no longer merely a form of expression of the artist and/or a commodity that is ready for the market. It has now become a platform for signifying the existence of artists to gain worldwide recognition through social media. The more viral and popular the artwork they make, the more well known the creators are” (Rusyada and Sutyono, 2021, p. 32).

Among the examples of contemporary artists who use social media for their promotional activities, it is impossible not to mention Banksy, who uses just one to spread his creations, that is Instagram. His real identity is unknown, and his artworks made on the streets of the world's major art cities are shared through this social media to rebel against the “classic” art system made by museums, auction houses, fairs and galleries.

Instagram is used by Banksy as a real political as well as artistic medium, since his art is built on criticism of contemporary society. For example, during the pro-Brexit election campaign he posted a British parliament populated by monkeys and, on the occasion of the opening of the Venice Art Biennale, he shared a video in which he criticized not only the Biennale but also the transit of large cruise ships in the Giudecca Canal.

Often, however, in order to reach a different audience and attract new users, some major museums have learned not only to create and share new, more interactive content, but also to collaborate with some important figures born in social platforms, the influencers.

The most striking example, because of the media rumors created by some of her shots, is surely that of Chiara Ferragni and the Uffizi Gallery in Florence.

The well-known influencer, being in the museum for a shoot for Vogue Hong Kong, visited the museum led by director Eike Schmidt, photographing herself in front of Sandro Botticelli's Birth of Venus and posting the shots on Instagram. The museum then took the chance and taking advantage of the influencer's presence, released a note telling the story of the event, posting the Instagram stories in which Ferragni invited her international followers to visit the Uffizi Gallery.

Although the visit sparked great controversy and criticism because of the disputes that arose from the comparison between the aesthetic canon celebrated in the 15th century by Botticelli and the international Chiara Ferragni, the results were very encouraging for the museum. Specifically, during 2020 for the first time, under-25 accounted for more than one-third of the total number of visitors to the Uffizi Gallery, amounting to +34.6%, equivalent to a growth of +24.9% in the bracket compared to 2019⁹. For the 19-25 bracket, there was a jump from 6.1% (2019) to 14.3% (2020), a growth of +134.4% over the previous year. The peak was reached in the two weeks following Chiara Ferragni's visit to the Uffizi Gallery.

Social networks are revitalizing the arts and will become increasingly important in everyone's daily life, especially for the younger generation. The arts have evolved and will continue to evolve and embrace this social revolution that has brought a new tool useful to the different actors of the sector, communicating and promoting themselves to their current and future audiences.

4.2.2 Art Actors on social media

In addition to contemporary artists who use social networks to share their works directly to their audiences bypassing traditional exhibitions, or museums that promote their exhibitions with photos and videos to make communication more interactive, there are also other players in the art sector who take advantage of these new tools, including for commercial purposes.

⁹ Foschini, C., 2021. Effetto Ferragni sugli Uffizi, boom di visite dei più giovani. Il direttore Schmidt: 'Crescita stabile per la fascia 19-25 anni'. la Repubblica [online], 1 (1). Available at: <https://firenze.repubblica.it/cronaca/2021/04/02/news/firenze_ferragni_uffizi_influencer_boom_di_visite-294813857/>

These include Art Galleries that use these platforms as a tool for the promotion and sale of artworks, also thanks to the possibility of opening a shop within the social channels, as happens, for example, on Instagram. This makes it possible to reach a large number of potential customers, who can either buy the work directly within the platform or contact the gallerist privately to obtain further information, regarding, for example, its authenticity, provenance etc.

This creates a process of democratization of the art market, no longer confined to an elite environment but globally, allowing even an ordinary user to feel part of this community. An example of an independent art gallery that believes in the process of art democratization led by social networks is definitely The Unit London¹⁰, founded in 2013 by two young artists Joe Kennedy and Jonny Burt and specialized in contemporary art.

The gallery uses social platforms (Facebook, Instagram, Twitter) to connect with millennials by promoting artists according to the core principle of talent and skill. The aim is to change the sector and bring together artists, collectors and passionate people in an inclusive way, eliminating the logic of exclusivism and investors typical of Art Galleries.

Their success on social media is based on the creation of relevant and interesting content in line with the personality of the Gallery and their audience, which has enabled them to reach important achievements.

In addition to Art Galleries, the simplicity and appeal that characterize social media has also won over another figure described in the previous chapter, the figure of art collectors.

Among the most appreciated features of these platforms are the ability to discover more rapidly new artists or galleries from all over the world from whom to buy the latest works and share their purchases and collections on social media to gain approval from their followers. The purchase of new works is based on a process of searching through the posts of favorite galleries and artists to select the ones that most impress them while being liked by the public. They, in fact, pursue art Influencer status in order to be actively involved in social media dynamics.

¹⁰ Caines, M., 2014. Arts head: Joe Kennedy and Jonny Burt, co-founders, The Unit London. The Guardian [online], 1 (1). Available at: <<https://www.theguardian.com/culture-professionals-network/culture-professionals-blog/2014/sep/16/the-unit-london-gallery-art-interview>>

Figure 19. Yusaku Maezawa and his Basquiats' artwork on Instagram



Source: Kinsella, E., 2018. Yusaku Maezawa's Blockbuster \$110.5 Million Basquiat Is Getting Its Own Brooklyn Museum Show. Artnet [online], 1 (1).

Among the examples of influencers in the art market is that of Yusaku Maezawa¹¹, a billionaire Japanese collector, who uses social channels, and specifically Instagram, to communicate his new purchases to his followers. These include Jean-Michel Basquiat's work "Untitled", created by the artist in 1982 and representing a crowned head typical of the artist against a vibrant blue background, purchased for the record amount of \$110.5 million at Sotheby's in 2017. The influencer used social channels to communicate his new purchase to the followers at the end of the auction, taking a photo beside the work. The same artwork that he decided to have depicted on his personalized birthday cake, shared through Instagram. He later revealed to his followers the following year that the painting will be the subject of a world tour, the first step of which will be at the Brooklyn Museum in his hometown and will terminate at a museum that Maezawa is building in Chiba, Japan. The intent of this traveling exhibition is to convey enthusiasm for this artist to young people and show Basquiat as an inspiration for all of us.

¹¹ Kinsella, E., 2018. Yusaku Maezawa's Blockbuster \$110.5 Million Basquiat Is Getting Its Own Brooklyn Museum Show. Artnet [online], 1 (1). Available at: <<https://news.artnet.com/art-world/yusaku-maezawas-blockbuster-basquiat-gets-show-brooklyn-museum-1194494>>

The world of auction houses has also embraced the strong potential of social media to communicate information regarding auctions, inviting their clients to discover online previews of lots before the catalog is published. Among them, it is impossible not to mention the classic Christie's, Sotheby's and Phillips, which operate their own profiles on the various platforms to share preview images of works coming up for sale and invite their followers to connect to their website to follow live streaming of the auction. Practical information regarding the times, locations, and display of works in the catalog is broadcast, saving time in customer research, and results of recently completed sales are also communicated.

This form of use is also joined by Art Fairs, which in their social profiles broadcast key information for buying tickets, alternating between photographs and videos of the artworks exhibited by gallery owners, behind-the-scenes multimedia tours of booth preparation with a focus on the artists exposed.

Today, thanks to the use of social networks, the methods of connecting and communicating with others, of sharing one's passions, and of discovering and learning about new artworks and artists have changed. The art world decided to participate in this transformation, and for this reason there are more and more artists, gallery owners, fairs, museums and collectors on these platforms who decide to share their activities with the general public. Social networks allow galleries and auction houses to connect with new potential clients, artists to show their works directly to the general public, and collectors to become more and more public figures. It therefore becomes increasingly crucial for everyone in this sector to understand how to make the best use of these new platforms, learning how to exploit their potential to achieve new goals.

4.2.3 Advantages, platforms and future perspective

Social networks, thanks to their visual and immediate characteristics, have become in recent years a key tool for artists, galleries, museums and other art actors to increase their popularity and relevance in a saturated market that requires a continuous ability to reinterpret themselves. These sector players can improve their operations, promotional strategies and relationship with customers in a new effective and efficient way, creating their own profile and sharing their photos and videos about their creations and exhibitions.

But how did they succeed in achieving a leading function in this particular market and transform the way they conduct and promote their business?

According to Nadaraja and Yazdanifard (2013) there are several advantages in the adoption of social network for businesses (including also the art market):

- access, profile and content creation for free, with the ability to create highly successful promotional campaigns with a limited budget;
- reduced costs compared to traditional marketing approaches because traditional intermediaries and distributors are removed, as is the case for artists who can no longer rely solely on galleries and the art elite to validate their success;
- improvement in coverage because social network allows you to reach customers not accessible with traditional channels due to time and geographic limitations;
- the ability to provide information and create personalized interactions with users, enabling transactions between customers and businesses that generally require human contact;
- the advantage of reaching their target market because it is the audience that wants the information, joins or voluntarily follows the profile;
- the viral nature of social media allows each person reading the content to broadcast the news within their network, reaching large numbers of people in a short time;
- the increase and creation of new forms of social interaction because people spend most of their time online in social networks;
- the ability to influence the behaviors of users who take greater heed of advice and information shared online, even if the sources are purely “virtual”;
- the interactivity of new media allows users to select content and make two-way communications, resulting in greater engagement, more positive attitudes, and more credible sources;
- the ability to learn more about their audience based on their personal interests, varying their offerings to effectively reach the most interested people.

The success of these new means of communication is due not only to the many advantages they offer both users and marketers, but also to their simplicity of use for which they have become increasingly intuitive over the years, with graphic and aesthetic features with a strong visual impact, which is well suited to a sector such as the arts.

Added to this is also the strong popularity that these platforms have in the world of celebrities, allowing them to become more attractive to the average user, with the possibility of getting known to the general public by simply obtaining a large number of followers.

The great variety and breadth of content that a person can find allows any user to find a profile aligned with his or her tastes, and at the same time the possibility of publishing content

freely, allowing everyone to be able to establish his or her name even in the art world, implementing a process of communicative and expressive democratization.

The most common and widely used social platforms include for example Facebook, Twitter, Instagram, Youtube, LinkedIn, Pinterest and TikTok.

Facebook is the main and most popular social network, although it does not have a clear identity because it allows all media to be shared, but can be particularly effective for marketing and promotional campaigns. Twitter, on the other hand, is mainly used to talk about certain topics and to discuss about them with people all over the world, with the possibility to create buzz around a news, thanks to hashtags, and create a community too. Instagram is the perfect social media to promote artistic creations because its younger community is interested in the aesthetic of things, in a fast and immediate way, with less space for words and more for pictures. Youtube is particularly useful to display the topics better with the use of videos, longer than the ones posted on Instagram and Facebook and not based on a casual search, attracting new people with interesting content, for example telling the story of a particular project. LinkedIn is a “professional” and “serious” social media, with high quality and relevant content for users, becoming a forum for sharing design, animation and behind-the-scenes pictures, which has attracted a great amount of attention. Pinterest is a graphic social media where it is possible to create “boards” and “pin” photos and videos, useful for customers to get inspiration on artwork to buy or for artists to realize, based on their tastes and preferences. Finally there is TikTok, the newest and most popular social media among Gen-Z, that has become the main platform for fast and entertaining video sharing, with an AI-algorithm that shows you videos based on your interest and your previous likes.

There are then different and multiple platforms that players in the art market are using and can use to promote themselves, share content and expand their audience. But social media, like art, is also constantly evolving, and in the future the platforms of the moment may change. According to Appel et al. (2019) some of the trends for the immediate, near and distant future of social media in promotion and marketing activities are as follows:

- Omni-social presence, due to the fact that social media enters into most aspects of consumers' lives, influencing their entire decision-making process, generating new needs in them and shaping artistic culture;
- New forms of social influence and influencers, which include not only big celebrities but also so-called micro-influencers who have a more targeted and authentic audience who enjoy watching a live streaming experience;
- Increased sensory richness, as we have moved from initially text-based platforms, to photo and video sharing, to a future full of technologies and sensors, such as

augmented reality (already present in some platforms), virtual reality (the new Metaverse) or new sensory formats based on voice and touch;

- Online/offline integration and complete convergence, to increase the effectiveness of marketing promotions and influence consumer behavior offline as well, relying on technologies such as augmented reality.

It is undeniable that social networks represent an effective marketing channel that supports artists, galleries and museums in managing existing clients and creating new ones, becoming now omnipresent in everyday life. Their emergence and diffusion have changed the way people know, communicate and meet each other and this is why a sector such as the art market, which is constantly evolving, must be redesigned according to these innovative tools.

4.3 Digitalization of the art trading

4.3.1 Online auctions, marketplaces and platforms

The digital transformation of the arts sector in reaction to the recent pandemic crisis has enabled an acceleration of the digitalization process that had previously mostly affected larger organizations. Without the pandemic this would have been achieved in a significantly longer timeframe with smaller increments due to limited investment because this new market was still seen by many as immature and collateral to a world that revolved around physical presence. During these two years, there has been an acceleration in the use of digital platforms for the buying and selling of art goods and of “hybrid” formats (mix of online and offline channels), adopted for example by auction houses with the auctioneer in presence in a specific room and the buyers, collectors and other auction rooms connected via streaming. This acceleration has resulted in a bouncing of turnovers and a broadening of the pool of potential buyers interested in the art world and able to attend events, with a particular focus on younger generations from different parts of the world. Digitalization has consequently brought new customers and generations, new business models and new payment methods, allowing this market to evolve, with the emergence of online auctions, e-commerce platforms, online marketplaces and applications for smartphones and other devices.

The birth of the first forms of online sales of artwork and collectibles can be traced back to the late 1990s, when the use of the Internet and the spread of computers into homes was

growing exponentially among ordinary users. However, most of the websites created in those years failed to survive the collapse of the “dot.com Bubble” in 2000, but later on, thanks also to the widespread use of the Internet and mobile devices in recent years, there has been a resurgence of the industry with new evolved players.

The continued success of the online art marketplace is due to its ability to disseminate information about art and artists instantaneously, connecting new and numerous buyers and sellers from around the world and driving colossal market growth across national borders. It provides greater access and transparency on prices, supply and demand, bypassing the many traditional intermediaries in both the primary and secondary markets. Trading is made more convenient and affordable, with the ability to search and find desired artworks more easily without the need to physically move. New generation users have changed the way they evaluate and buy art, conducting price comparison surveys through data collection platforms on auction results (ex. ArtPrice) and paying electronically from home.

Despite their convenience and accessibility, online art sales channels still struggle to establish trust with elderly customers, who are more inclined to make purchases using traditional offline channels, and present still some issues to be addressed related to questions of authenticity, provenance and state of preservation of artworks, especially in the case of non-specialized internet platforms. For this reason, according to Moulin (2003) and McAndrew (2019) “it is not surprising to find that the large majority of online sales in art markets are made in the lower and mid-price segments, particularly in the case of online-only companies [and that] online channels have become extremely important as the major source of new clients for art galleries and auction houses, particularly those operating in the lower and middle tiers” (see Fernandes and Afonso, 2020, p. 2-3).

In the structure of the online art market, it is possible to distinguish between *hybrid art enterprises*, such as traditional galleries and auction houses that operate both offline and online to create new sales and marketing channels, and “*pure*” *online art enterprises*, which exist exclusively in virtual space. According to Sidorova (2019) there are three main types of “*pure*” *online art enterprises* currently functioning in the art market:

- *Online auctions* (ex. Auctionaftersale, Barnebys, Birdsquare, Heritage Auction, Hihey, Invaluable, LiveAuctioneers, Thesaleroom, Paddle8, etc.) who are benefiting most from the growth of online sales and are able to attract each year more customers who can bid from the comfort of their homes and hosted auction houses, selling larger quantities of lots at higher average prices;
- *Online galleries* (ex. Artgallery, Degreeart, Ideelart, Newbloodart, Upriseart, Weng Contemporary, Zatista, etc.) are virtual showrooms intended to display and sell

artworks, and are gaining the attention of art dealers who do not want to spend money on renting physical gallery space, because the new generation of buyers tend to purchase works online, without following the conventional norms of viewing and buying offline;

- *Online marketplaces* (ex. 1stdibs, Artnet, Artsy, Artandcollect, Artviatic, Saatchiart, etc.) are online art platforms that allow buyers to immediately purchase artworks with a click-to-buy function, as happens on Amazon for example. They serve as an entry point for new art collectors, granting them direct communication with artists and gallerists and connecting them into a single platform.

The three types of actors here identified are not the only ones because the structure of the online art market is constantly evolving, so in the next future we expect the emergence of new players in the market. Among them, we cannot omit to highlight the growing role of social media in the online art trade, which has given birth to the so-called *Social media art market*. One example is definitely Instagram, which for some years now has activated within the platform a number of functions dedicated to businesses, such as Instagram Shopping, which allows you to create a post or story containing a tag for a product with which you are redirected to the brand's website where you can view more information and continue the payment process, and Instagram Checkout, which allows you to complete the transaction entirely on Instagram with just a few clicks, entering billing, shipping and payment information without leaving the app. With these new features offered by Instagram, the aesthetic social network for excellence that best suits the art market, a powerful new sales channel is offered for artists, art galleries and auction houses, capable of democratizing and expanding market access to Millennials and Generation Z. And while for now this type of sale follows the click-to-buy function, in the future with further development of the platform, it may lead to the spread of online auctions within the social platform, with the ability to log in, follow the live streaming sale and place your own bid.

The development of the art market has led to the creation of new platforms for buying and selling artworks, connecting buyers and sellers from all over the world, but some digital technologies with strong potential will allow a future expansion of online trade, especially from the perspective of transactions, to make them more secure, accessible and traceable.

We now introduce them in the next paragraph.

4.3.2 Cryptocurrency, tokenization and fractional ownership

The revolution in the online art market does not only come through new platforms for buying and selling artworks, but also in the ways of payment and transmission of purchased works. The phenomenon of cryptocurrencies in the online art market is quite new and its application is still limited. Cryptocurrencies are a digital asset used as a medium of exchange that allows payments to be sent and received without going through a central authority, such as a bank, using the Blockchain technology we described before. Among the different cryptocurrencies, the most commonly used and accepted ones are Bitcoin, Ethereum, Tether, Ripple, Binance, Dogecoin etc.

Despite some skepticism from market participants, even in the arts, cryptocurrencies are beginning to be considered a technological innovation with strong potential to transform this market in the future. Among the advantages of accepting cryptocurrencies in art market operations are the protection of art collectors' privacy, the tracking of art sales and commissions, and the possibility of expanding its buyer audience to younger and more “geeky” buyers. At the same time, however, there are drawbacks given by the introduction of cryptocurrencies in art market transactions such as the risk of creating a black market of dubious transactions that could worsen the reputation of the online marketplace and the large fluctuations in value that bring significant risks for those receiving payments in this form.

Despite these potential risks, in recent years thanks to the advent of NFTs there has been an expansion of online and offline art institutions, both public and private, willing to buy and sell artworks by adopting cryptocurrencies as an alternative payment method instead of real money in order to reach a global audience and attract more customers.

Among these “the London-based Moniker Art Fair that specializes in street art was the first among all European art fairs to introduce “virtual” money into art business. The also London-based Dadiani Fine Art was the first European art gallery to have completely shifted, since 2017, to making art market transactions in cryptocurrency. Today, the most “crypto-active” online art trading platforms include Cointemporary, Whitestone Coin, and Maecenas... The first European museum to buy art for bitcoins was MAK Wien (Museum of Applied Arts in Vienna) [that] in 2015 purchased Harm van den Dorpel’s Event Listeners for a particular amount of bitcoins” (Sidorova, E., 2019, p. 5-6).

Analyzing the entire online art and collectibles market and the many marketplaces on the web, according to the Hiscox 2021 report, the ability to pay with cryptocurrency is an option that currently affects only 13% of digital platforms, but could affect an additional 38% of

platforms that will adapt to this new payment method over the next 12 months (Hiscox Online Art Trade Report 2021).

Connected to the phenomena of the application of Blockchain technology and payments with Cryptocurrencies in the art market there is a new phenomenon in the world of art transactions, namely that of the tokenization of art, which proposes the idea of fractional ownership of the artistic good, whether physical or digital. This phenomenon, with strong potential for consolidation for the short to medium term despite the risks associated with speculation, corresponds to the creation of “tokens” representing the ownership of a fraction of a tangible or intangible, virtual or physical asset, stored via Blockchain technology (predominantly Ethereum).

The existence of multiple tokens for a single artwork can reduce the “barriers to entry” of purchasing high-value assets, where even small collectors can be part of a large project and open up new frontiers for the art market, with the possibility of creating a more liquid and larger secondary art market where it is possible to sell these tokens and make ownership transitions, increasing their value and creating fluctuations in the market.

Tokenized artworks are generally sold through downward auctions, so-called Dutch auctions, in which an initially high price is set to deter bidders and is gradually reduced until someone is willing to buy at the last current price. This is applied for a period of time predetermined by the platform operators, after which the algorithm of the selling platform divides the artwork into stocks that are assigned to the winning users. Generally the 51% of the total stocks remains in the possession of the original owner, while ensuring that the other shareholders enjoy the relative right of economic exploitation (rent to gallery owners, etc.). The remaining 49% is issued in the form of stock certificates that are traded among the shareholders themselves and while the sale is free, the purchase involves a commission from the buyers.

The first example of tokenization of an artwork is a two-meter-high painting by the famous American artist Andy Warhol, “14 Small Electric Chairs” (1980)¹², undertaken in July 2018 by Maecenas Fine Arts, a blockchain-based platform that wants to “democratize” access to fine arts, and Dadiani Syndicate, the first gallery in the United Kingdom to decide to accept cryptocurrency payments. At the end of the cryptocurrency auction, about \$1.7 million was raised, representing a 31.5% share of the artwork whose total valuation was \$5.6 million. More than 800 bidders registered for the auction, and while the owner retained the majority of the shares, the remaining was distributed among the winners together with digital certificates

¹² Emem, M., 2018. Andy Warhol’s Multi-Million Dollar Painting Tokenized and Sold on Blockchain. Yahoo Finance [online], 1 (1). Available at: <<https://finance.yahoo.com/news/andy-warhol-multi-million-dollar-162928721.html>>

of ownership. And this is where Dadiani Syndicate, the London-based Mayfair art gallery that owns the painting and has agreed to sell partial shares by receiving cryptocurrencies in return, comes in, led by the famous art dealer Eleesa Dadiani, whose aim is to bring the world of art investment to a wider demographic.

The tokenization and cryptocurrency payments are revolutionizing today's landscape of transactions and trading of artworks, creating new forms of investment that are traceable, transferable and democratic, where every investor enjoys the same rights with amounts that are not necessarily large and where galleries and museums, that own the artworks, can liquidate even a part of their investment, financing new projects and new spaces for emerging artists.

4.3.3 The next step: the Metaverse?

The topic of the Metaverse became popular on a large scale after Mark Zuckerberg, founder of Facebook, announced that he had changed the name of his company to Meta and started a new way of interaction with the web, although before him other companies had already realized its potential and were creating products and services in this extension of the real world. This new interactive and digital world offers great potential and growth opportunities for companies and in particular for the e-commerce and online shopping sector. For this reason, many companies across multiple industries, such as Walmart, Nike, Adidas, Gucci, etc., are launching virtual “stores” and opening the way toward the progressive transformation and digitization of the retail and e-commerce sector. But what is the Metaverse?

According to J. P. Morgan (2022, p. 3) “the Metaverse is a seamless convergence of our physical and digital lives, creating a unified, virtual community where we can work, play, relax, transact and socialize”.

A key point is that there is no single virtual world but many worlds that, by adding an immersive, three-dimensional layer to the Web, enable the creation of unique and natural experiences, breaking down boundaries and democratizing access to goods, services and experiences. The concept of the metaverse is not new because online role-playing game worlds such as The Sims have existed for years, but now thanks to several technological developments, such as Augmented and Virtual Reality (AR and VR), combined with Blockchain technology that has enabled the creation of cryptocurrencies, NFTs, new methods of transaction and ownership of digital assets, there has been an acceleration towards this new digital world.

The Metaverse has given birth to the so-called metanomics, its market economy, which promises to offer new growth opportunities for all sectors. With an online avatar, one can decide to change what he wears by buying digital clothing, or can start a small business of his own, such as an art gallery where he/she can display his/her digital collection. If one wants to furnish a virtual home, he/she can buy original artwork tokenized as a digital asset. Of course, it is necessary first to own the land where the house is built, and that is why platforms such as Decentraland, based on Ethereum, offer users virtual lots, in an ever-growing real estate market due to big brands that are buying space to create their own virtual stores.

The Metaverse marks the beginning of a new era for online shopping, offering brands and customers a new dimension, made up of virtual stores that users can explore with their avatars to make digital purchases. This new reality will not replace traditional channels, but will become an additional marketing driver to connect with younger customers such as Millennials and Gen Z, as well as increase sales in the “real” world. Another benefit is related to the concept of brand awareness, as the Metaverse will become a showcase for companies that will have the opportunity to offer new experiences to users, increase their loyalty and improve their reputation both online and offline, positioning themselves as young and innovative.

These opportunities also affect the art market and trade, and for this reason Sotheby's¹³ also decided to embrace this new digital world. The famous auction house decided to launch in October 2021 a platform to host all future NFT sales, called Sotheby's Metaverse, where artists and collectors can sell, buy and view some of the most prestigious NFT artworks. This new platform offers technical advances that the main Sotheby's website could not previously implement. The structure and layout of the Sotheby's Metaverse website, similar in format to NFT-specific marketplaces such as OpenSea and Nifty Gateway, is designed to display NFTs so that viewers can easily see the transaction history of any piece. Unlike these platforms, Sotheby's Metaverse offers a description of the characteristics of each item, along with the artist's biography and those who decide to sign up receive a gift of a profile picture designed by the well-known NFT artist Pak. The platform also has other several features:

- *Centralized framework*, because buyers who decide to sign up are required to submit to an identity verification process and auctions are conducted off-chain, so the parties involved in the transaction choose to have an agreement outside of the Blockchain, while the actual transaction is executed on the Blockchain;

¹³ Investimenti magazine, 2021. Sotheby's Metaverse: What it is and How it works. Investimenti magazine [online], 1 (1). Available at: <<https://www.investmentimagazine.it/sothebys-metaverse-cose-e-come-funziona/>>

- *Hybrid payment infrastructure*, as on Sotheby's Metaverse buyers can make payments with fiat currency (dollars, euros, pounds, yen..) or cryptocurrency (Bitcoin, USDC, Ether.);
- *Buyer's Premium*, meaning that for each winning bid, the bidder must pay a Buyer's Premium, usually ranging from 13.9% to 25% and an Overhead Premium of 1%, except in cases where these fees are exempted;
- *Reactive bidding*, because Sotheby's enables a reactive bidding system that automates the response in case your own bid is suddenly outbid by another buyer, to ensure that you remain the leading bidder, up to the maximum amount you are willing to pay for the NFT.

The first NFT auction conducted in Sotheby's Metaverse between the 18 October 2021 and 26 October 2021 featured 53 lots of prestigious artworks, including a CryptoPunk, Bored Ape Yacht Club, Rare Pepe trading cards, Cromie Squiggle and some Cool Cats, from 19 collectors and artists, such as Paris Hilton, Pranksy, Steve Aoki and j1mmy.eth. The 8-day auction ended successfully, with a total of \$17 million in sales, the highest of which was a Rare Pepe NFT that went for \$3.6 million.

Figure 20. BOOMing Contemporary Art Show in the Metaverse



Source: Graziano, A., 2022. BOOMing Art Show lands in the Metaverse. Close-Up art [online], 1 (1).

Another example of the application of the Metaverse in the art trade is BOOMing Contemporary Art Show¹⁴, the first Italian contemporary art metafair, that during the

¹⁴ Graziano, A., 2022. BOOMing Art Show lands in the Metaverse. Close-Up art [online], 1 (1). Available at: <<https://closeupart.org/booming-art-show-sbarca-nel-metaverso/>>

pandemic decided to come to the Metaverse thanks to the collaboration with Lieu.city, a platform for art-related events in Augmented Reality. In the metafair, held online between the 20 and 23 January 2022, the spaces of the central platform of DumBO in Bologna were accurately reproduced, as well as the layout of the twenty-five art galleries displaying the works of more than 70 artists organized according to three different areas. These include the works of emerging artists using all technical and expressive fields, urban art with artists who have made its history and finally art dedicated to feminisms to give space to women, who are still underrepresented in the system, with prominent female figures in the national and international art scene. The user, or better his or her avatar, has the possibility to freely move across the stands of the fair, put like to the exhibited works he or she prefers and request information, such as price and size, as well as, of course, having the possibility to buy the exhibited artworks, without the reverential fear in dealing with gallery owners and art dealers. Although currently the Metaverse still seems to be far from present reality, there is no doubt that it is already beginning to change the rules of the game, thanks in part to the push of NFTs, cryptocurrencies and Blockchain technology. We are talking about a real revolution for the art trading world that will lead to further breaking down the typical barriers to entry in the art market. This virtual space is slowly evolving, creating a new way of communicating and building relationships with buyers around the world, with a more realistic and interactive experience than classic web browsing. Art dealers are realizing that the revolution has already begun, and for this reason they have started to invest in the development of new platforms and to access and create their own commercial space in the metaverse.

The future of art trading has just begun.

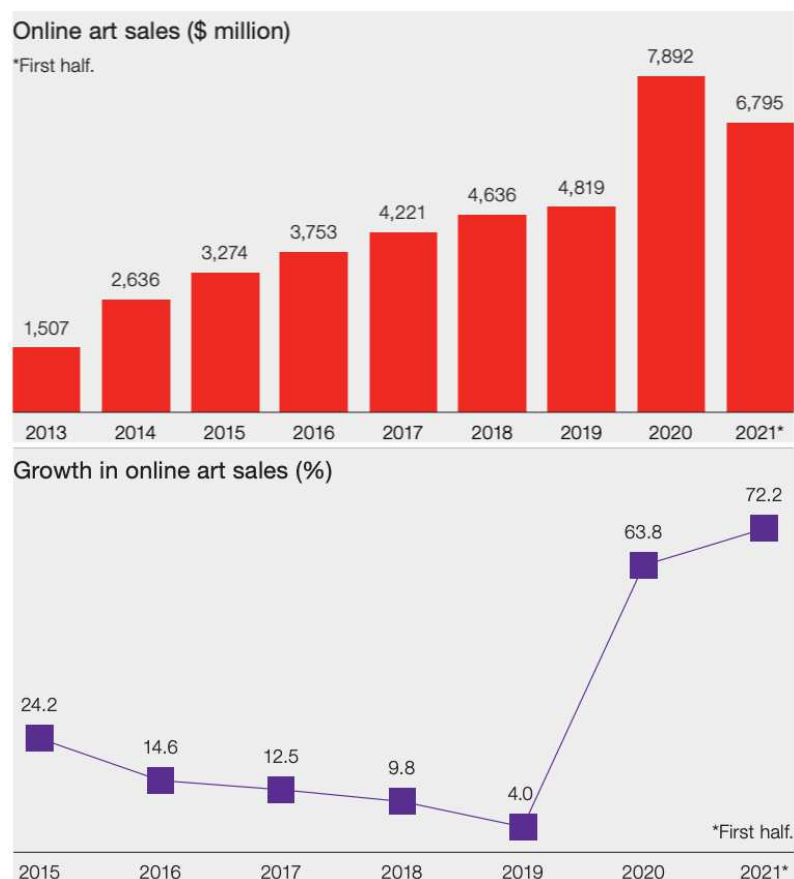
4.4 The digital situation in the art market

From 2020 there has been an acceleration of the convergence between the digital world and the art and collectibles market as a result of the pandemic crisis. There has been a growth of the use of digital platforms and “hybrid” formats for buying and selling art goods in response to restrictions and the need to keep remote business relationships alive. Digitalization is a trend that had previously affected large organizations with a long-term time horizon, but after this obligatory conversion, the advantage of offering a mix of physical and digital offerings was realized, which resulted in the rebound of turnovers and the expansion of the user base, particularly of younger people. This overcomes the “physical” barrier of geographic distance determined by the location of the sale, allowing people from all over the world to purchase

artworks, but also the “psychological” barrier of connecting and investing in a new world, especially for those new to the field.

As can be seen from Image 21, after several years of declining growth in online art sales, these experienced a boost during the pandemic, benefiting from the closures and restrictions to in-person meetings that pushed operators to move from offline to online channels. Online sales growth in the first half of 2021 is up 72% to \$6.8 million, not far from the total online sales in 2020 (\$7.9 million), which saw a 64% increase over 2019 (\$4.8 million). Sales may reach \$13.5 million in 2021, keeping the same growth rate in the second half of the year (Hiscox Online Art Trade Report 2021).

Figure 21. Online art sales (\$ million and % growth)

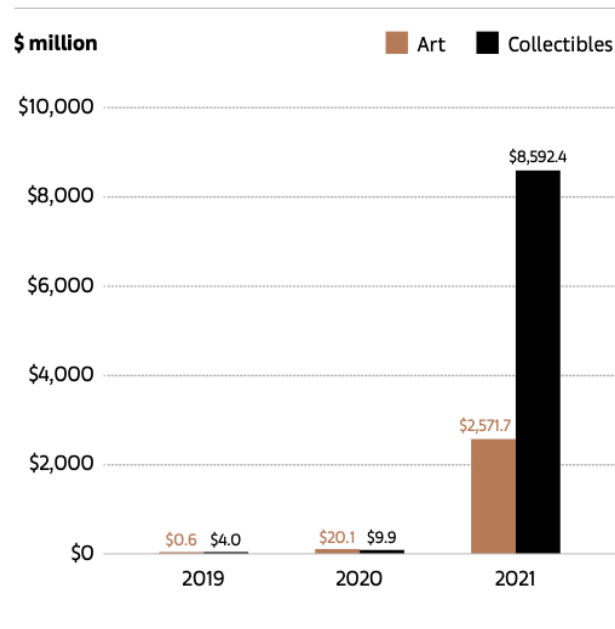


Source: Hiscox online art trade report 2021 - p. 4-5

Among the art assets that have been given the most attention as a possible strategic investment asset by the general public there are digital art, crypto art and NFTs, which are attracting new potential buyers, especially Millennials, thanks to the possibility of receiving an electronic certificate with an encrypted code attesting the uniqueness and ownership of the artwork. In particular, looking at Image 22, art and collectible NFT sales grew from \$4.6

million in 2019 to \$11.1 million in 2021. The value of art-related NFT sales increased a hundredfold in 2021 compared to the previous year, reaching \$2.6 million, with even greater growth for collectibles, which reached \$8.6 million (Art Basel & UBS Report 2022).

Figure 22. Sales of Art and Collectibles NFTs 2019–2021



Source: The Art Market 2022 - Art Basel & UBS Report - p. 42

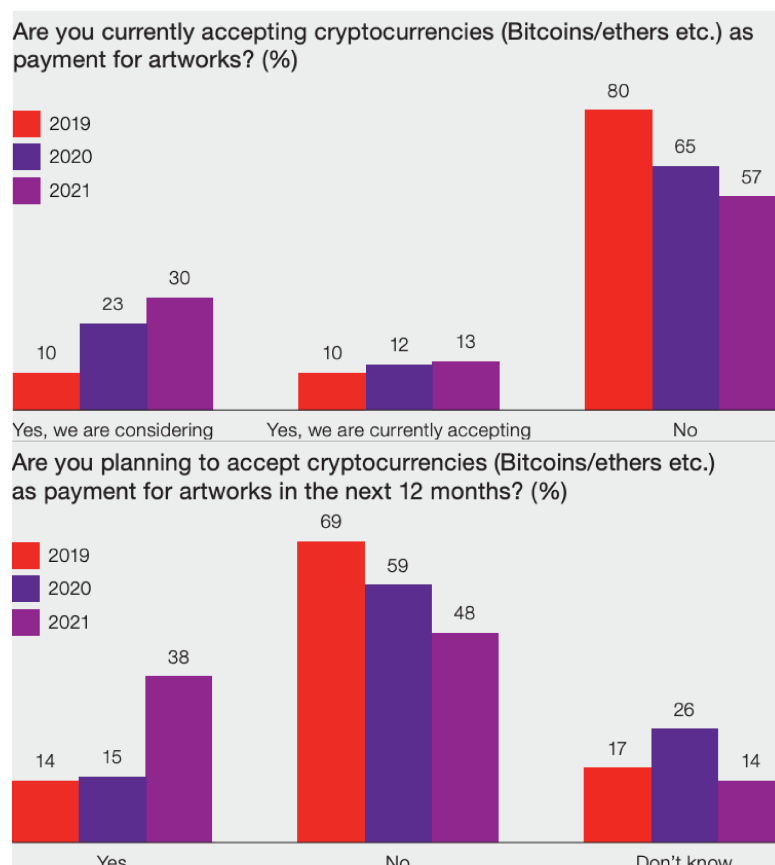
The rise of NFTs has also strengthened the trend of opening up to electronic payment in cryptocurrencies, which for now affects the major players active in the digital market and the large auction houses such as Sotheby's, but may expand to other players in the future.

Among the companies surveyed, as can be seen in Image 16, online platforms that currently accept cryptocurrency payments are growing to 13% (up from 12% in 2020 and 10% in 2019), with an additional 30% saying they are considering doing so (up from 23% in 2020 and 10% in 2019).

Numbers that remain well below the majority (57%) who currently say they do not accept them, but are encouraging because they are decreasing from previous years (from 65% in 2020 and 80% in 2019).

When asked about planning for cryptocurrency payments in the next 12 months, 38% of platforms (up sharply from 14% and 15% in 2020 and 2019) said they plan, 48% do not (down sharply from 59% and 69% in 2020 and 2019) while the remaining do not know (Hiscox Online Art Trade Report 2021).

Figure 23. Current and planned cryptocurrencies acceptance as payment for artworks



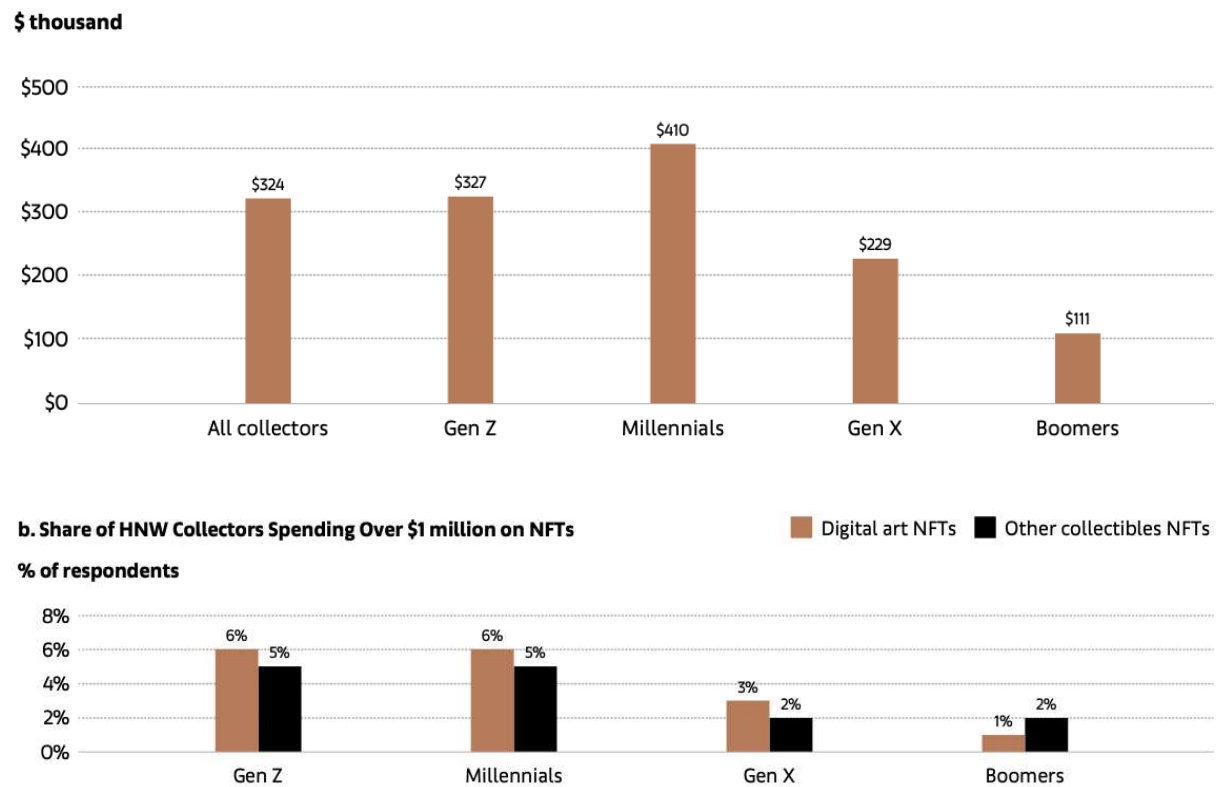
Source: Hiscox online art trade report 2021 - p.24

Another trend concerns the entry in the art world of new buyers, especially under 40, and the consequent lowering of the average age of buyers, which has driven the recovery of the market, the digitalization of operators and the success of NFTs, which can now be purchased in an increasingly accessible way thanks to the fragmentation of the ownership of assets. The growing interest in digital art was very evident, particularly for younger collectors, as can be clearly seen from the data on digital artworks expenditure in Image 24.

Looking at average spending and focusing on those who purchased digital art in 2021, younger collectors spent more than their older counterparts, with Millennials recording the highest average (\$410,000).

They are followed by Gen Z who record an average of \$327,000, Gen X with \$229,000 and "only" \$111,000 for Boomers. The higher spending by the younger generation is also supported by data on the share of High-Net-Worth collectors who spend more than \$1 million on NFT artworks and collectibles, where the small share of 6% of collectors belonging to Gen Z and Millennials exceeds those of 3% of Gen X and 1% of Boomers (Art Basel & UBS Report 2022).

Figure 24. HNW Collector Average Expenditure on Digital Art and over \$1 million on NFTs by Generation in 2021

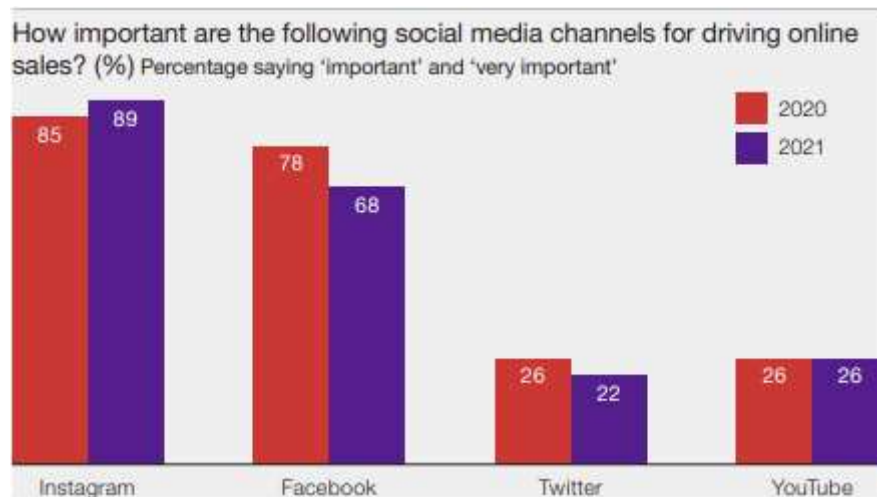


Source: The Art Market 2022 - Art Basel & UBS Report - p.232

To interact with this younger generation, it is becoming increasingly popular for operators in the sector to communicate on social channels, among which Instagram excels for its image-based language, due to the increasing and massive use of mobile devices such as smartphones and tablets. These platforms, daily updated with new functions, are also used for buying and selling artworks, as well as representing a highly relevant promotional channel. For this reason, galleries, auction houses, museums and fairs actively use social media to promote artists, their history and their artworks, but also to tell the behind-the-scenes story of exhibition preparation to create curiosity for potential online and offline visitors.

As can be seen in Image 25, Instagram remains the most important social media channel for sales, according to 89% of online sales platforms, up slightly from last year (85% in 2020). The second-ranked platform is Facebook, declining in importance according to respondents, from 78% in 2020 to 68% in 2021. Twitter is also declining, from 26% in 2020 to 22% in 2021. A quarter of online sales platforms (26%) said YouTube is important for online sales, maintaining the same value as in 2020 (Hiscox Online Art Trade Report 2021).

Figure 25. Importance of social media channels for driving online sales



Source: Hiscox online art trade report 2021 - p. 6

This chapter explored the application of digitalization in the art sector, both from the perspective of the creation of the artwork and its subsequent promotion and marketing. Digitalization has changed the way art is made and led to the emergence of new styles and works (Digital art, Crypto art, AI art, AR/VR art, 3D printed art) as well as developing new techniques for the restoration and preservation of ancient artworks. Social networks are investing an increasingly important role in promoting actors and have led to the emergence of new figures such as art influencers. The emergence of new platforms and marketplaces for online commerce has brought a further boost to market growth, resulting in the development of new remote payment methods and the acceptance of cryptocurrencies. The rapid success of NFTs and the spread of Blockchain technology and cryptocurrencies announces an immersive future, where e-commerce will take place in a virtual world inhabited by human avatars, the Metaverse.

All this has brought significant benefits for the different players operating in the market, both on the supply and demand side, who have been able to convert their systems to the digital era, eliminating space and time barriers, expanding their target audiences and reducing costs.

The real question to ask now is whether even on a practical level digitalization really brings opportunities for everyone, and to answer this question the best solution is to consult some of the experts in this field, who work every day in the art sector and are in first person the protagonists of this digital transformation that is gradually expanding.

5. Qualitative analysis: sample description and findings

5.1 Methodology and sample description

Since scientific research and literature on the relationship between the two topics of digitalization and of the art market are quite limited, it was decided to explore the topic further by adopting an inductive research approach. Indeed, this approach is particularly appropriate for addressing recent areas of research that have not yet been well analyzed and contextualized.

In particular, the approach presented here can help us to better understand the digitalization strategies undertaken by different organizations in a traditional market such as the artistic market. In fact, the inductive research method adopted here is based on qualitative exploratory research based on the study of multiple cases, as these provide detailed data and allow for more robust and general results than the analysis of a single specific case.

These case studies, which belong to the artistic sector present in the Italian and international scene, were selected based on their relevance to the research topic with respect to digitalization in the art market as previously described.

In particular, the realities of the sector were selected focusing on their relevance in the context and the artistic offer, with the aim of having a more complete view of the phenomenon, that is, how digitalization is becoming more and more determinant for their success in the sector and is increasingly widespread among the different operators.

The interviews are based on a series of semi-structured questions, which are open to further questions that may emerge during the conversation with the interviewee based on the answers given. In general, the interview guideline (found in Appendix A) consists of three sections: in the first section, the interviewee is asked about his or her current professional role and his or her review on the main events that shaped the company and the art market during the recent Covid-19 crisis, their economic impact, and the main drivers that allowed the industry to recover from this shock. In the second section, the respondent is asked about the three main issues of impact of digitalization in the industry, represented by trade, promotion and art creation, respectively, with a personal judgment on the main features, the related clientele, and the advantages and disadvantages provided. Finally, in the third section, the respondent is asked for an overall concluding judgment on the extent of this phenomenon in the industry and with plans for improvement on the digital front expected in the future.

The six interviews were conducted remotely by streaming through the use of the Zoom platform for a total of about 4 hours, or written through the use of emails, over a time frame from August 3, 2022 to September 16, 2022.

The questions were addressed to key figures in the companies, such as the Director, General Manager, Senior Specialist, Deputy Director and Specialist, Chief Operating Officer.

Table 1 provides a more detailed account of the interviews conducted and the characteristics of the interviewees in terms of company type, size according to the number of employees, adoption of digital channels for sales, openness to digital artworks and NFT, the use of social networks for online promotion, role of the interviewee and interview duration.

Table 1. Main traits of the firms interviewed

Interview	Size	Type of player	Digital sales channels	Digital artworks and NFT	Digital promotion on social media	Interviewees roles; total duration
1	Small	Art Gallery	YES	YES	YES	Director; 1h
2	Big	Auction House	YES	NO	YES	Director; 0h (written)
3	Big	Online Auction Platform	YES	YES	YES	General Manager; 1h
4	Big	Auction House	YES	YES	YES	Senior Specialist; 0h (written)
5	Small	Online Marketplace	YES	NO	YES	Chief Operating Officer; 1h
6	Big	Auction House	YES	YES	YES	Deputy Director and Specialist; 1h

Source: Personal elaboration

Table 1 shows the characteristics of the sample surveyed, all belonging to the art and collectibles trade sector. Specifically, classifying the sample in terms of size according to the number of employees, two companies are classified as small (up to 50 employees) and four as big (more than 250 employees). Regarding the type of companies surveyed, three companies belong to the category of auction houses, one belongs to the profile of art galleries, one is

classified as an online auction platform and one as an online marketplace. The table also presents information regarding the adoption of digital channels for online sales by the different players, as well as social networks for promotion, in which they all show a presence. Relative to the openness to the sale of digital artworks and NFTs, four companies have decided to open for sale while two currently have not. Information regarding the role of the interviewee (Director, General Manager, Senior Specialist, Deputy Director and Specialist, Chief Operating Officer) and the length of the interview (usually 1h each for interviews via Zoom) complete the picture.

Let us now briefly summarize the most critical elements that emerged from each interview:

❖ *Interview 1*

This small contemporary art gallery decided a few years ago to undertake a path open to digital assets, particularly the world of NFTs, while also getting in touch and collaborating with an Italian auction house. The digital approach has enabled it to expand its clientele on the international front and arrive prepared for the recent pandemic crisis, but without yet being able to achieve results comparable to an established physical market. Digitalization in art trading will tend to grow, however, leaving a niche market that will not abandon the physical medium. Digital artworks and NFTs are seen as more than just a trend able, after the speculation of the past few years, to create an increasingly quality and sustainable market. The adoption of social networks is well developed, although it remains critical to Instagram and TikTok because of their overly consumerist nature and lack of audiences' focus compared to other platforms such as Facebook and Youtube.

❖ *Interview 2*

This big and important art auction house is active in continental Europe and covers all areas of art, from major arts to niche collecting. It has been active in the online market for years, which allowed it to arrive prepared during the lockdown period due to the pandemic in 2020, converting all the auctions online with positive financial results. The conversion to digital for sales channels has allowed this auction house to attract new buyers into their world, with the market responding positively to this conversion. Online auctions are seen by this operator as the future, with business set to grow, while still not diminishing the importance of in-person auctions. At present, this auction house has no plans to sell digital or NFT artworks, as they are still seen as a trend of the moment. The use of social networks, on the other hand, is well developed, as these

new channels allow for immediateness in the transmission of content to interested users, and the most widely used are the popular Facebook, Twitter and Instagram.

❖ *Interview 3*

This large online auction platform for buying and selling art and collectibles is mainly active in Europe, with some presence in Middle Eastern and Southeast Asian countries as well. The focus is on four main macro categories, namely art, collectibles, jewelry and luxury, and classic cars. It calls itself an international marketplace, as every item can be purchased in any country, and curated, because the selection follows specific guidelines, is reviewed by professionals in the field, and transactions are guaranteed and protected. Since its birth, the company has been active exclusively in online commerce, and during the recent Covid-19 pandemic it has remained operational at all times, benefitting from the closure of traditional offline channels, gaining new clientele and achieving positive economic results. This company is continuously seeking to make its platform increasingly friction-less and transparent, both for buying and selling, including partnerships with external companies, such as those in the logistics industry. It has recently embarked on some experiments in selling digital and NFT artworks, achieving discrete results but not yet as massive as traditional art, which still remains their main offering. The use of social networks is well developed, as channels such as Facebook and Instagram allow them to reach their core clientele, with an age range of 30 and up.

❖ *Interview 4*

This big auction house is active worldwide and deals in intermediation for luxury goods of various kinds, from major arts to niche collectibles, both through public sales and private negotiations. The implementation of online auctions and digital services driven by the pandemic has allowed it to become even more global and accessible to all. Digital sales channels have allowed this auction house to approach new buyers, but also to push more traditional customers to this new way of buying. Investments in online auctions will continue, but without disregarding the importance of in-person auctions, as they are profoundly different in terms of involvement. Art offerings also include digital and NFT art forms, which are capable of conquering even historic collectors who like to complement classic and innovative art forms. The use of social networks is a key point for the communication and promotional strategy of this auction house, helping it in reaching an international audience of buyers with the use

of different socials according to its target audience, such as WeChat for the Eastern audience, in addition to the famous Facebook, Instagram and Twitter.

❖ *Interview 5*

This small online marketplace for buying and selling contemporary art and design, operates internationally on two fronts, one is BtoB working with galleries and art fairs and one is BtoC working directly with collectors and end customers. Based exclusively in online trading, it has remained operational throughout the recent Covid-19 pandemic, benefiting from the forced digital transition by galleries and art fairs and gaining a new clientele interested in art not only as a form of investment but also as home decoration. This small flexible reality is continuously looking for new services to offer its clients, especially in the BtoB world, no longer only related to visibility, content and sales, but also to logistics and the adoption of new digital technologies such as AI, AR and Blockchain to become more and more transparent, including through partnerships with external companies. Up to now, this platform does not offer NFT, preferring at the moment to build a solid basis around Blockchain technology, on which to reflect in the future for a possible opening to this new digital art form. The use of social networks is mainly based on Instagram, the strongest in terms of visibility, Facebook and LinkedIn, both for sales and for a form of edutainment, but it is also open to other newer social networks such as Tik-Tok and Twitch.

❖ *Interview 6*

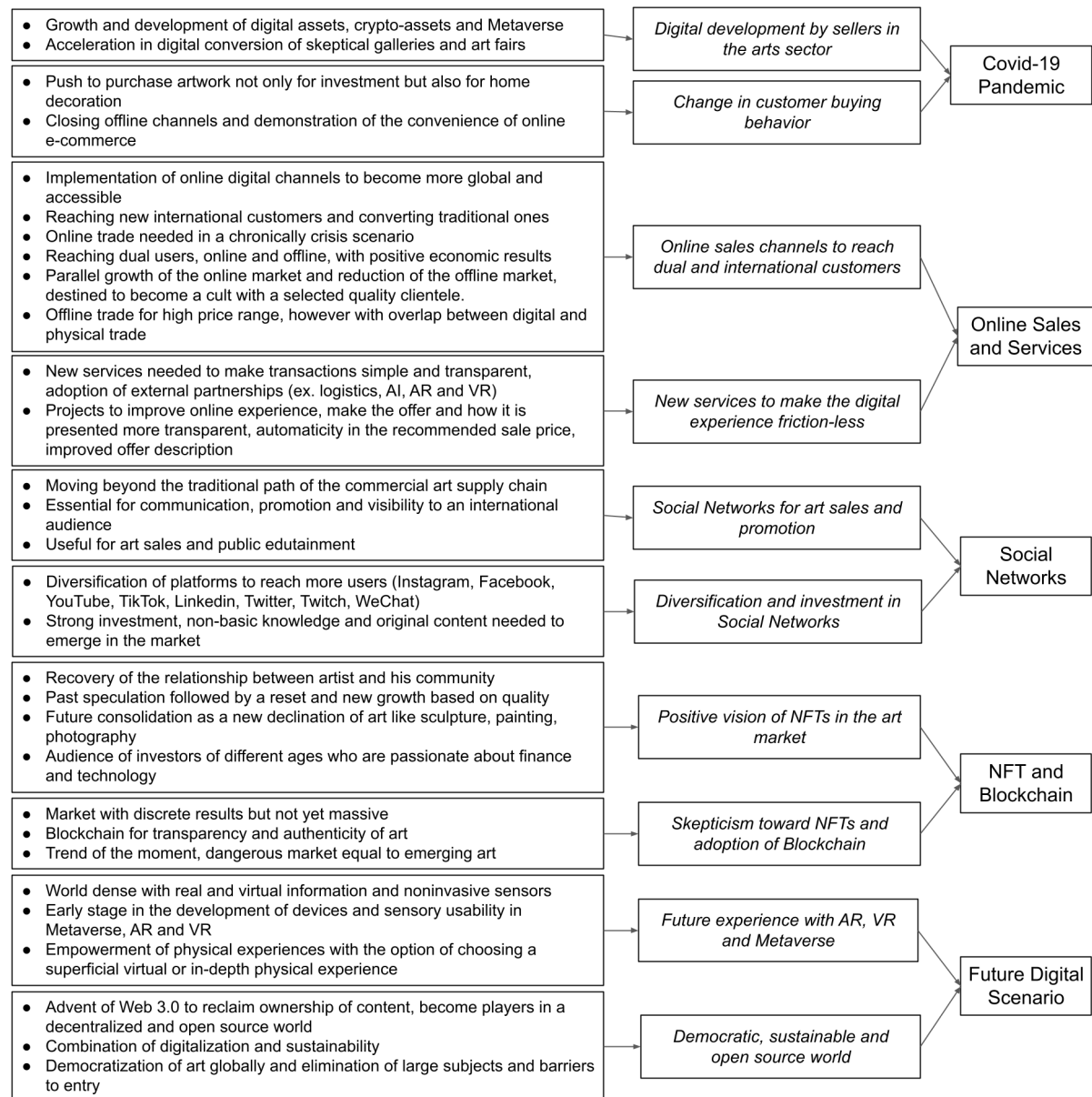
This global auction house is one of the world's largest brokers of fine decorative arts, jewelry and collectibles. Its structure, strong in all areas, allows it to use digital tools in a modern way and to be very responsive to this type of innovation. Its developed online platform has enabled it to arrive prepared for the pandemic challenge, creating a new auction calendar, reaching new users and exceeding the business volume compared to the pre-pandemic level. Most auctions are now conducted online, with extremely agile lead times, and new digital services have been implemented, such as the online valuation portal, helping to improve the final user experience. Prospects for online trading are flourishing, without neglecting the importance of in-person events, boosting the access of customers under the age of 40. The offerings also include digital and NFT art forms traded in the Metaverse, which will need to evolve following the initial boost, not only following security and technological criteria, but

also content criteria. The use of social networks is crucial for communication and promotion, which has now become paperless, helping to reach audiences of different ages, even with the use of younger social networks such as Tik-Tok.

Ultimately, the data collection of the interviews conducted followed a methodological rigor: the interviews were recorded, transcribed, analyzed and coded to understand the similarities and differences in the openness strategies to digitalization implemented by different companies in the art and collectibles trade sector.

The coding scheme adopted, conceptualized by Gioia et al. (2013), has the following features: as shown in Figure 26 below, we have an initial open coding aimed at identifying concepts and their properties and dimensions (1st Order Concepts) by grouping individual sentences and events into subcategories and categories. Then, an axial coding was performed by grouping the categories and by linking them together in a reasonable way (2nd Order Themes). Lastly, selecting a central category and relating it to other macro-categories concludes the reasoning (aggregate dimensions). The main findings of the research were determined through the use of such procedures.

Figure 26. Data structure



Source: Personal elaboration

5.2 Main findings

Starting from the representative quotations at the disposal (some examples are cited in APPENDIX B), the coding process ultimately resulted in five aggregate dimensions of themes, namely “Covid-19 Pandemic”, “Online Sales and Services”, “Social Networks”, “NFT and Blockchain” and “Future Digital Scenario”. In the quest for digitalization in the art market, among these five topics have emerged the main themes of theoretical research. In particular, companies in this traditional sector, driven in part by the recent pandemic crisis, are

leveraging online trade with services, promoting their offerings through the use of new Social Networks and questioning the adoption of new art forms (like NFTs) and digital technologies. Based on the coding scheme adopted, each dimension will be discussed in further detail in the following paragraphs.

5.2.1 Covid-19 Pandemic

The recent pandemic crisis triggered by Covid-19 has impacted all economic sectors, including the traditional art and collectibles sector.

Many companies in this sector that hardly approached the digital world, claiming to maintain a classical approach to their business model, have been forced to remove this skepticism, especially in Italy, and find an on-line opportunity to keep their business alive, especially during the period of the hardest lockdown.

These last few years have been interesting for the development and growth of new technologies related to the digital world, with the appearance of topics related to the Metaverse, digital assets and virtual reality among the general public.

Of course, this conversion was not a new thing, but it was already fundamental before, and the online art market had been discussed for years. Only this unpredictable event gave an extra psychological boost, showing companies and people that this digital world is a support to keep their business alive, especially that of local small businesses.

All the companies interviewed reported that they had already adopted this digital approach years ago, thus finding themselves prepared to contrast such an unexpected event that revolutionized everyone's lives and remaining always operative. And the results in economic terms prove it. In particular, only one company of the six interviewed, reality 1, highlights a decrease in the market, but this is due to its focus on the digital art world, which is not yet as mature in terms of development, devices and usability as an established physical market.

The other five companies, on the other hand, emphasize an acceleration of the sector and a higher growth of their business than previous years, driven by the closure of traditional offline trade channels and the discovery by many people of the convenience of online purchases.

People, not only collectors but also young buyers, finding themselves forced to spend more time at home, have been driven to purchase artworks not only as a form of investment, but also from a decorative point of view to decorate and furnish their homes.

In conclusion, the recent pandemic crisis has accelerated the digital conversion of traditionally skeptical sector players, revolutionizing people's buying behavior and given further impetus to

the development of virtual experiences related to the Metaverse that will characterize the coming years and in which many large companies are already investing.

5.2.2 Online Sales and Services

Healthcare challenges, such as the Covid-19 pandemic, and international crises, such as the current energy crises also triggered by the conflict between Russia and Ukraine, will tend to become more or less common, and as a result, the use of technology for commercial purposes will become increasingly frequent.

The implementation by companies in the industry of new digital channels and online services has enabled them to become increasingly global and accessible to all. For example, one can consider a small local country gallery, comparing the amount of audience that it can reach by remaining confined to offline commerce, with the amount of audience it can attract by offering its works directly online.

The customers reached were thus double: on the one hand, the new and international ones, who through the online presence were able to learn about the existence of new operators, and on the other hand, the traditional ones, more tied to offline commerce, who in part were able to convert to this new online commercial and communication approach.

This not only concerns operators selling art and collectibles such as auction houses and art galleries, but also museums, which, with the implementation of new technologies for the virtual enjoyment of artworks, will be able to have a much larger audience and diversify their entries, not only the offline ones in their location, but also the online ones of people from different parts of the world.

All operators interviewed converged toward a common thought: the strong success of online conversion of commerce, which will continue to grow in the future as well as related investments, but without forgetting the importance of physical commerce in presence. The latter will become a high quality and stable niche market over time, with more select customers going into the other online market.

There will indeed be a balance to be struck and the digital world will never completely replace the offline one anytime soon, as the two participations, although with the same purpose, are profoundly different starting with the involvement in relationships. Indeed, the art world has always been based on very strong social relationships, not only to sell artworks, but also to talk and get to know each other between artists and collectors, between sellers and customers.

These two worlds will therefore go hand in hand, without replacing one with the other, but keeping both alive because both are very important. One of the interviewees, reality 3, points out that offline commerce is also likely to focus on a higher price and value range, while still presenting some overlap with digital commerce, as evidenced by auction houses' records in selling artworks by major international artists.

Interviewees also converge on another common point: the need to provide more and more services to their customers, with continued investment in their digital platforms. The goal is to make it increasingly easy to buy or sell online by improving the digital experience on the platform and developing partnerships with outside companies on certain useful services. These include, for example, logistics for transporting artworks, providing transparency on shipping costs and creating insured shipping boxes, artificial intelligence to help buyers with suggestions for choosing artworks that suit their tastes, augmented and virtual reality to help in the creation of virtual galleries and fairs, software and algorithms to give greater quality and transparency to photographic presentations, identifying the recommended price on a particular artwork and how to present and describe it appropriately.

In conclusion, the implementation of online digital channels now seems inevitable in today's scenario and has made it possible to reach an international clientele, without, however, diminishing the importance of physical commerce, which will remain omnipresent. Simply offering artworks and collectibles is not enough for operators, who must still continuously invest in making their online platforms increasingly transparent, intuitive and accessible.

5.2.3 Social Networks

The adoption of social networks by operators in the arts sector has been crucial during these last few years, which have been characterized by continuous closures and restrictions that have changed people's social relationships, their way of communicating and getting to know each other and led to the emergence of new forms of promotion and distance selling.

All the artistic realities interviewed undoubtedly agree on the usefulness of these platforms of interaction, which are necessary to reach in an immediate way a heterogeneous and international audience of possible interested buyers and to stay constantly in touch with their current followers.

Their use in a professional and studied manner is well suited for the promotion and sale of visual arts and collectibles, while at the same time requiring non-basic investment and

knowledge to reach a sufficient audience and to make one's posts stand out in an original way within the multitude of images and videos that now flood users every day.

Communication through these channels, however, has not varied for all practitioners with the advent of the pandemic. Older, traditional galleries and art fairs, especially in Italy, have increased their online communication and presence compared to the past, as they can no longer count on the same historical collectors, trying to engage younger generations in order to continue to survive. New entrants, born thanks to online commerce, have not varied their use of social networks, but have aimed to improve it substantially, taking advantage of the increasing time people spend on these platforms.

Among the platforms most used by respondents, in addition to emerging the evergreen Instagram, Facebook and Twitter, there are also new alternatives.

The strongest medium among the interviewees is definitely Instagram, where even the individual artist is able to put their work up for sale, keeping their market alive without needing the traditional commercial supply chain. Instagram is also a place where many collectors look at artists' pages, comment on their works, giving them more visibility through their comments and likes. This medium has now become important not only for the artist, but also for galleries and online platforms, both for selling artworks and for conveying information according to a form of edutainment, where content is the fundamental basis. However, one interviewee (reality 1) points out some critical issues in using this platform. In particular, unlike Facebook, which represents more in-depth and textual content, Instagram tends to null out the content, arriving at a simple world made up only of immediate images with an attention span of a few seconds and an extremely consumerist view of the artwork.

In addition to Instagram and Facebook, Twitter also emerges, which is particularly useful for transmitting links and information in text form, and LinkedIn, with a more informative and educational role. Other interesting approaches are characterized by the use of videos such as YouTube, for a selected audience that goes deeper into the content, and Tik-Tok, where especially young people promote their own works and provide information about the art market with a huge potential still not much exploited by this sector. Other platforms that emerged in the interviews are represented by Twitch for live streaming, and in the case of international players also active in the Asian market (like reality 4), the use of WeChat to promote works by artists close to Eastern tastes.

Thus, what emerges for all is a diversification in the use of social platforms, in order to be able to expand their fronts and reach a wider and wider audience, with in the future the development of interfaces, also related to Metaverse, as in Mark Zuckerberg's idea with Meta.

In conclusion, the interviews reveal the growing role of social media in the promotion and sale of art and collectibles, with diversification of platforms to expand the audience and heavy investment to give more visibility to their original content.

5.2.4 NFT and Blockchain

Another theme analyzed in the course of the interviews is that concerning the offer by sector players of new digital art forms that have been much talked about in recent pandemic years and that have established themselves in the sector while also reaching important quotations, namely NFTs.

Responses to this theme varied among those interviewed, in particular with four of these six (reality 1, 3, 4, 6) choosing to open up to this new art form, while the other two (reality 2, 5) at the moment decided to continue to focus on more traditional art forms. Among those who have opened up to this new world, there emerges a vision of something more than just a trend of the moment and an extremely free art form, characterized by the artist's ability to use new techniques and achieve uniqueness and authenticity in their artwork.

Added to this there is the elimination of the risk of being penalized by careless management at the stage of work authentication, failing to reach the big market due to inconsiderate management by foundations, successors etc.

Another point in favor of this new form of art consists in the creation and growth of a community by the artist, eliminating the vision of a distant and detached artist, recovering a direct link between the user, the collector, and the producer, thus the artist.

This new innovative art form brings with it some critical issues, such as a digital fruition that is still at the beginning of what it will have to become in terms of sensory approach, and the past speculative activity that has brought the movement of capital of dubious origin. Speculative activity carried out mainly by a clientele consisting of crypto-investors, investors and financial operators, which was followed by the bursting of the bubble and the reset of the market, which started growing again thanks to the search for quality, with NFT native artists bringing a vitality that had long been lost in the contemporary art world.

The results from the operators who have decided to open up to this new art form were discrete, but not yet massive enough to represent their main offering, while remaining positive and such that they believe this type of art will become one of the new declination (such as sculpture, painting, photography) that collectors will be able to access.

A common thought emerges among the interviewees regarding the clientele of this new art form, that is, not necessarily made up of young collectors and consequently independent of age, but related more to the personality of the buyer. In particular the type of clientele for this art form is those who view the artwork as a form of investment, as well as having a passion for the world of finance and technology.

Among those who have decided not to open up to the world of NFT emerges the view of NFT as a trend of the moment and a dangerous art market, comparable to the emerging art market, where there is still a lot of speculation. Therefore, these operators (reality 2, 5) have decided to focus on their current traditional art offerings, without diversifying too much, so as not to risk slipping. In particular, for reality 5, the decision not to open up to NFTs is not an irrevocable choice, as it was followed by the decision to adopt Blockchain technology to catalog artworks, in order to establish a solid base on which to then also open up to the NFT world in the future, regardless of the changes that will then take place in the market.

This openness to Blockchain is based on the desire to make its processes increasingly transparent, knowing all the steps that a work of art has taken throughout history, in a market that has always been highly opaque. Transactions through this technology become increasingly secure, the authenticity of the artwork by a particular artist becoming incontrovertible, in order to achieve an increasingly democratic art market.

In conclusion, the impact of NFTs in this sector has generated different responses from practitioners, and while some see them as an important opportunity for the future, there are also those who see them as a fashion of the moment or a market that is still too dangerous, but without excluding a possible opening in the future. Linked to this new art form is also Blockchain, a technology seen instead as a concrete opportunity to make the industry more transparent than in the past.

5.2.5 Future Digital Scenario

The future digital scenario that emerges from the analysis of the interviews is that of the advent of an open-source, democratic and sustainable future world.

In particular, with the increasing development of technologies such as augmented and virtual reality, as well as the Metaverse, and the advent of increasingly powerful and less invasive wearable hardware, we will come to a world dense with real and virtual information intersecting with each other, as well as the access to distant worlds outside of reality. Digital systems will become faster and faster, immersive, low-cost and increasingly part of our daily

lives. This underlies the democratization process of the art market that came up several times during the interviews.

The Web 3.0 revolution will lead users to reclaim ownership of their content and artworks, as well as to become active players in a world without central intermediaries. Whereas in Web 2.0 users entered the web as content creators, which, however, eventually belonged to the big players, what is happening today is a return toward an open source world, which works better than closed systems, where content is open and every user can make his or her own contribution to change.

The advent of digital is driving the democratization of art, allowing many more people and artists than in the past to create and make their creations known. To be exhibited in an art gallery currently the barriers of entry are enormous and made up of multiple actors, such as gallery, critics and foundation. In contrast, the barriers of entry to become known digitally are much lower, and the visibility of works by the audience can be redistributed according to a more organic logic.

The issue of digitalization even in the art sector goes hand in hand with the ecological commitment to sustainability. This is based not only in the simple replacement of catalogs and paper media with their digital counterparts by different operators, but also in the development of digital offerings that will allow anyone from anywhere in the world to, for example, view an exhibition or access an art gallery in an immersive way from their home TV or viewers. The user will then have the option of being able to choose the depth and level of interaction to view a particular exhibition, that is, whether to view it in a superficial and virtual way, or in an in-depth and physical way, further enhancing physical experiences as something more valuable and important.

Of course, a digitalizing world also brings with it some critical issues, such as a growing army of new hackers, exposing users to the risks of fraud and new dangers, all of which are, however, already present in today's world as well.

In conclusion, all interviewees converge toward a single view that sees the digital world as necessary, without drawbacks and with a future development parallel to the physical world.

Digitalization will have to take place while leaving the physical importance to the physical, without going to affect the connection that the art world has with the physical, with social relationships, with the passion and beauty of seeing things from a physical point of view.

6. Conclusions

The core purpose of this thesis was the deepening of the digital transformation of organizations operating in the art and collectibles market, a historically traditional sector that has, however, also proven to be extremely dynamic, especially in the face of the recent pandemic crisis.

Primarily, the research concentrated around two fundamental aspects, the digital transformation and the art market, which were first discussed separately. In particular, by distinguishing different terminologies, it has been understood how digital transformation does not concern the simple technological adoption but also the cultural and mental factors of people within the organization. The pillars for this transformation are *customers* who are increasingly protagonists, *competitors* with whom it is increasingly necessary to collaborate, *data* that are increasingly useful for business decisions and the continuous need to *innovate* their offerings in order to create a unique *value proposition*. For this, new technologies such as *IOT* to connect one's products, *Big Data* to collect information to be stored then in the *Cloud*, *AR* and *VR* to develop new digital environments, *Blockchain* for transparency and disintermediation in trading, *Additive Manufacturing* to achieve customization become increasingly necessary. Through these technologies, combined with digital skills on the part of one's employees, it then becomes possible to evolve one's business model, especially during periods of crisis and instability such as these last two years.

Subsequently, the theoretical analysis focused on the art market, a market that originated in the Classical Age and evolved over time following economic dynamics. Its supply and demand components follow their own rules, due to the uniqueness of the artworks, and feature a multitude of players, including the artist, dealers, auction houses and art fairs, museums and biennials, ending with the end buyer who does not only buy art for decorative purposes, but also as a form of alternative investment. Despite the climate of uncertainty in recent years, the art market has achieved extraordinary results above expectations, thanks mainly to digital conversion.

For this reason, the investigation afterwards focused on analyzing the meeting of the two previously discussed themes, discovering how digitalization has already enabled the evolution of this traditional field for years. In particular, the digital transformation has led to the emergence of alternative art forms, such as Digital Art and Crypto Art, AI Art thanks to algorithms, AR and VR Art to achieve alternative worlds and 3D Printed Art to achieve opera

perfection. All this is not only for the creation of new artworks, but also for the restoration of older ones in order to bring them back to their former glory. Digitalization has also allowed for the evolution of the main communication channels used for art promotion by art operators. Social networks have now become fundamental and used by artists to communicate with their followers, by museums, art fairs and galleries to reach new international customers, but also by buyers as well, becoming in some cases a kind of sector influencers. The digital wave of the last few years has also led to the emergence of new platforms and marketplaces for online trading and to new forms of payment and purchase based on cryptocurrencies and the tokenization of artworks, leading in the close future to new meeting places for the purchase of art by personal avatars in what is now called the Metaverse. The current digital situation in the industry has seen growth in recent years in online art trading, with a focus on the world of Digital art, Crypto art and NFTs, with the introduction to alternative cryptocurrency payments and the entry of new buyers, belonging to Generation Z and Millennials.

After this initial theoretical phase, motivated by the desire to merge theoretical analysis with practical observances, an empirical research was performed based on an exploratory qualitative analysis conducted during the months of August and September 2022. Through a structured interview protocol, an investigation was conducted with a sample of six companies to identify and understand the main digitalization strategies implemented by organizations in the sector, also in the light of the recent healthcare emergency.

The organizations surveyed therefore experienced: a strong digital conversion by sellers and a change in customer shopping behavior as a result of the Covid-19 pandemic; the development of new channels for online sales and new digital services for customers; an enhancement in communication and sales through the use of Social Networks in a diversified manner; contrasting results and visions regarding the advent of new Digital art forms represented by NFTs; and, in addition, a more democratic and sustainable future scenario characterized by the increased development of new technologies such as AR and VR.

Analyzing more in detail, the interviews revealed how the pandemic represented a real accelerator in the digital transformation process, especially for the most skeptical operators, creating in them that psychological boost to understand the usefulness of this conversion. Even buyers, forced to stay in their homes because of lockdowns, have rediscovered the desire to furnish and decorate their homes to make them more attractive and comfortable. All respondents, having a digitalization process behind them, were able to be ready, resilient and antifragile in facing this unexpected crisis, achieving overall very positive results.

Online sales have therefore enabled the achievement of an international and omnichannel customer base. This online market will continue to grow in the future, without diminishing the importance of the offline market, as it has different characteristics and because of the need to still maintain a physical link of social relationships that only the physical can provide. Online sales platforms and channels, with the growth in investment, will tend to evolve and be characterized by a multitude of new services related to new technologies, perhaps in the near future merging with the embryonic Metaverse.

Promotion in Social Networks has been crucial during the restrictions caused by the pandemic in order to maintain social relationships with one's current customers, meet new customers, and sell at a distance. Of course, considerable investment and time is also required in order to make one's posts original and viral, as well as to diversify messages with the use of multiple platforms targeted by age and geographic location. But it's worth the risk.

Digital art and NFTs have had a significant impact in the sector during these past two years. However, since they are an art form that has developed recently, and where there has been a great amount of speculation and volatility in the past due in part to their connection with the world of cryptocurrencies, the responses from practitioners are still uncertain. While on the one hand there is an extremely positive view of this phenomenon, seen as something still in its infancy but destined to become more and more prominent in the coming years thanks to quality works, on the other hand it is seen as a trend of the moment, dangerous because of its strong volatility and without the possibility of achieving such massive results as currently projected.

However, the future digital scenario appears to be very optimistic, as emphasized especially in Interview 1. A new world is on the horizon, characterized by increasingly powerful and less invasive devices that will allow these new art forms to establish themselves. The Web 3.0 revolution linked to the Metaverse, will take us into a future without intermediaries and sustainable, where even a traditional sector like art will see the advent of a new form of democratic art and the fall of the barriers to entry to the art market created in the past by galleries, foundations and critics. A world in which the artist will be able to freely exhibit his or her art, make himself or herself known in the marketplace and connect with the audience.

This study therefore provides a general overview of the strategies in terms of digital transformation that arts practitioners have adopted and may consider in the future to evolve their business model and develop a resilience base that will enable them to grow, address current and future economic threats in a reactive manner and arrive well prepared for the next digital scenario in the sector.

It is acknowledged that the survey conducted has some implicit limitations, despite the use of an established empirical research methodology. In fact, the qualitative analysis, characterized by a small sample consisting of six economic entities, may prevent a generalization of the results, and for this reason it is open to future investigations that may analyze the phenomenon on a larger sample of enterprises with a longer time horizon, offering a better understanding of the phenomenon and a further opportunity for debate and reflection.

Appendix A. Interview outline - Art and Digitalization: a study of digital adoption in the art market

1. ROLE OF THE RESPONDENT AND A COMMENT ABOUT THE ART MARKET

This part aims to understand what is the role of the interviewee within the company and the current business model, but also to get some information about the art market situation during the pandemic and the drivers useful for the recovery.

1.1 First of all, could you give us some information about your role and the fundamental traits that characterize your company?

1.2 A brief commentary related to the art market over the past two years. In particular:

- a) What were the limitations (openings and closures) to your activities and what impact did they have on your economic results (positive or negative)?
- b) What are the main drivers that have enabled the market and your company to recover from the pandemic shock and maintain contact with customers?

2. DIGITALIZATION FOR THE ART CREATION, PROMOTION AND TRADING

This part aims to understand what is the role played by digitalization, digital technologies and social media for the art creation, promotion and trading in the organization interviewed.

2.1 The pandemic outbreak has generated big reorganizations in the art trade (hybrid and online auctions, e-commerce, digital and virtual fairs and events etc.).

- a) Has your company implemented new digital strategies? Which of these do you think have been most effective?
- b) How has the market responded to the proposal of goods and artworks through digital channels? What kind of customers do these new channels attract?
- c) What are the future perspectives of online commerce? Will its growing attention reduce the importance of in-person events?

2.2 Digital art and NFTs are now a market reality, and some artworks have reached surprising results.

- a) In your opinion, is this a trend of the moment or a trend that will become established in the future? What kind of customer is this new art form attracting?
- b) What motivations have driven this great interest and what are you doing about it?

2.3 A comment about the use of Social Networks in the art market. In particular:

- a) Do you think they are useful for the promotion and sale of artworks? What advantages and disadvantages can they bring?
- b) How do you currently work with social media? Has the emergence of the pandemic increased your online presence?
- c) Is there a difference between the various social media in terms of function, customers, and message conveyed? Which are the most widely used and why?

3. FINAL THOUGHTS ABOUT DIGITALIZATION AND FUTURE PROJECTS

This final part aims to understand what is the interviewee's final thought about digitalization in the art market and the digital projects the organization is planning for the future.

3.1 To conclude this brief interview, digitalization is taking on an increasingly important role in a traditional field such as art.

- a) Are you favorable or unfavorable to digitalization in the art market? What advantages and disadvantages has it brought and will bring in the future?
- b) Do you think that one day there will be a total “switch” to digital or some “physical” will always remain?
- c) What are the improvement projects on the digital front that you are working on and will work on in the future?

Appendix B. Representative quotations

<i>AGGREGATE DIMENSIONS</i>	<i>SECOND ORDER THEMES</i>	<i>FIRST ORDER CONCEPTS</i>	<i>REPRESENTATIVE QUOTATIONS (Interview)</i>
Covid-19 Pandemic	Digital development by sellers in the arts sector	Growth and development of digital assets, crypto-assets and Metaverse	“Negli ultimi due anni abbiamo visto lo sviluppo abnorme di quelli che chiamiamo metaversi, che poi in qualche modo sono assimilabili a quelle che erano già prima le gallerie online o virtuali. Sono cose che ci sono sempre state, erano molto poco utilizzate. Diciamo che in questo periodo hanno avuto una grande crescita e si sono legate al mondo dei metaversi al mondo degli asset digitali e dei crypto asset. In qualche modo sono tutte cose collegate.” (1)
		Acceleration in digital conversion of skeptical galleries and art fairs	<p>“In realtà per quanto ci riguarda, fenomeno comune anche ad altre realtà digitali, la pandemia ha accelerato la transizione dall’offline all’online.” (3)</p> <p>“Le gallerie che sono sempre state molto restie al mondo online, anche banalmente le gallerie sono sempre state molto lente dal punto di vista di digitalizzazione, quindi nel sviluppare i loro siti web e mettere le loro opere a disposizione di piattaforme online.. essendo che tutte le gallerie, specialmente in Italia, hanno dovuto chiudere, avere uno sbocco online era molto importante per mantenere viva l'attività della galleria.” (5)</p> <p>“Quello che diciamo sempre è che la pandemia ha accelerato dei processi che erano già in corso, dando una spinta definitiva verso il digitale, sofisticando in maniera sempre molto più raffinata e sartoriale le offerte della casa d’aste verso l’utente, il collezionista finale.” (6)</p>
	Change in customer buying behavior	Push to purchase artwork not only for investment but also for home decoration	“Le persone dal lato BtoC, trovandosi a passare più tempo in casa, al di là del grande collezionista, anche il giovane ragazzo che vuole iniziare ad arredare casa, si ritrova a fare ovviamente più acquisti online e di conseguenza anche dal punto di vista decorativo e non solo d'investimento, si ritrova ad apprezzare il mondo online.” (5)
		Closing offline channels and demonstration of the	“Con la pandemia molti dei canali tradizionali dove vengono fatti scambi, non digitali ma offline, erano non disponibili sia per quanto riguarda chi vendeva che per chi acquistava. Quindi chiaramente una parte degli acquisti si è spostata dal mondo fisico al mondo digitale ed è una transizione in parte

<i>AGGREGATE DIMENSIONS</i>	<i>SECOND ORDER THEMES</i>	<i>FIRST ORDER CONCEPTS</i>	<i>REPRESENTATIVE QUOTATIONS (Interview)</i>
		convenience of online e-commerce	<p>permanente, perché comunque ha fatto sì che molte persone abbiano scoperto ancora di più la convenienza di un canale digitale arrivando ad un livello internazionale.” (3)</p> <p>“Le aste online sono anche per noi internamente molto più semplici da seguire. Nel senso che la due diligence che tu devi fare sulle opere è sempre la stessa. Però hai dei tempi di esecuzione, di produzione di cataloghi eccetera immensamente più agile, per cui sei molto più veloce e questo sicuramente ha creato una piattaforma molto ricca, molto varia e gli utenti, a parte i primi momenti in cui erano un pò disorientati, adesso hanno perfettamente capito e si sentono tutti molto a loro agio.” (6)</p>
Online Sales and Services	Online sales channels to reach dual and international customers	Implementation of online digital channels to become more global and accessible	<p>“Tutte le aste sono state convertite online con grande successo. Ancora adesso le aste sono online e le aste più importanti in live.” (2)</p> <p>“Il mondo online dà possibilità enormi, molto più importanti rispetto a quelle che possono essere offerte da molti piccoli operatori sul mercato offline. Pensiamo ad esempio a chi si rivolge ad una piccola galleria di paese, quale possa essere il pubblico che può raggiungere quella galleria rispetto al pubblico che uno può raggiungere, proponendo la propria opera direttamente online.” (3)</p> <p>“La principale limitazione è stata costituita dall'impossibilità di continuare con gli appuntamenti live: esposizioni ed aste non erano più possibili. Il problema è stato risolto implementando le aste online e i servizi digitali, grazie ai quali siamo diventati ancora più globali e accessibili a tutti.” (4)</p>
		Reaching new international customers and converting traditional ones	<p>“Molte persone si sono avvicinate al nostro mondo grazie alle aste online.” (2)</p> <p>“Oltre ai nuovi clienti che si sono affacciati ai servizi digitali, siamo rimasti piacevolmente stupiti nel vedere anche i clienti più “tradizionali” avvicinarsi a questa modalità di vendita e acquisto.” (4)</p>
		Online trade needed in a chronically crisis scenario	<p>“Questo tipo di problematiche sanitarie diventeranno più o meno comuni, così come le crisi internazionali tenderanno probabilmente a diventare croniche in termini di grandi polarizzazione, per cui sicuramente il ricorso alla tecnologia in termini di commercio, in termini di comunicazione sarà frequente.” (1)</p>

<i>AGGREGATE DIMENSIONS</i>	<i>SECOND ORDER THEMES</i>	<i>FIRST ORDER CONCEPTS</i>	<i>REPRESENTATIVE QUOTATIONS (Interview)</i>
		Reaching dual users, online and offline, with positive economic results	<p>“I clienti che abbiamo raggiunto sono duplici: una parte sicuramente più internazionale di clienti, e diciamo di quelli vecchi, solamente una piccola parte è riuscita un po' a riconvertirsi a questo tipo di nuova realtà di comunicazione e anche di approccio commerciale.” (1)</p> <p>“Potrebbe essere interessante dal punto di vista della struttura, anche museale, che in questo modo riesce ad avere un bacino d'utenza molto più vasto e in questo modo, diversificare i propri ingressi in modo da non vendere solo i biglietti, ma anche improntare delle strategie digitali, più legate alla visualizzazione online e questo tipo di realtà.” (1)</p> <p>“Noi siamo al +23% sul primo semestre del 2021 e +40% sul primo semestre del 2019. Quindi abbiamo superato egregiamente tutto quello che è il volume d'affari che c'era prima della pandemia, perché vuol dire che il mercato si è ripreso alla grande.” (6)</p>
		Parallel growth of the online market and reduction of the offline market, destined to become a cult with a selected quality clientele	<p>“Nella mia visione il mercato diciamo della fruizione, del mondo dell'arte fisica, sicuramente un pochino cederà, ma rimarrà comunque un caposaldo per tutta una categoria di clientela di qualità che sicuramente tenderà ad allargarsi all'altro mercato... diventerà sempre di più un mercato di culto, un mercato di qualità per i clienti più selezionati.” (1)</p> <p>“Le aste online sono il futuro, quindi il commercio online crescerà sicuramente, ma senza ridurre l'importanza delle aste in presenza, anche perché le più importanti sono in live.” (2)</p> <p>“Il mondo online non deve e non vuole andare a sostituire quello che è il fisico. Il mondo dell'arte è sempre stato fatto di relazioni sociali molto forti, di networking, anche banalmente, il fatto di andare in fiera non è soltanto per vedere le opere, ma per un continuo scambio, per riconoscersi tra artisti e collezionisti.. Quindi secondo me è un mondo, non andrà a sostituire l'altro, devono andare di pari passo. Ed è proprio anche una sfida, questa, nel senso che non si può essere restii all'online e dall'altra parte l'online non deve mirare a calpestare i piedi al fisico ma anzi, ho avuto modo di capire che sono molto importanti entrambi. La giusta filosofia è quella di volerli mantenere vivi tutti e due, perché solo quello è il modo poi di riuscire a far funzionare bene le cose.” (5)</p>

<i>AGGREGATE DIMENSIONS</i>	<i>SECOND ORDER THEMES</i>	<i>FIRST ORDER CONCEPTS</i>	<i>REPRESENTATIVE QUOTATIONS (Interview)</i>
			“Quindi le prospettive del commercio online sono floride. Nel senso che non è che adesso che si torna alla normalità non si fa più quel tipo di lavoro, si fa eccome. Anche perché certe abitudini di ricevere tutto online, la gente dopo si abitua alla velocità. Capisci? Quindi non torna indietro. Però la manifestazione in presenza secondo me avrà sempre importanza perché stiamo parlando di opere d'arte e la gente vuole vedere dal vivo. Quindi chi può verrà a vederle, sia da noi in asta che alla fiera, alla galleria.” (6)
		Offline trade for high price range, however with overlap between digital and physical trade	“Il commercio offline forse rimarrà su una parte più alta di prezzi.. Ci sarà comunque un overlap nel caso. Comunque anche le grandi case d'asta fanno proposte totalmente digitali. Però posso prevedere che comunque sia, per quanto riguarda l'offerta più alta, ci sia ancora uno spazio per l'ambiente offline, un ambiente di offerta fisica.” (3)
	New services to make the digital experience friction-less	New services needed to make transactions simple and transparent, adoption of external partnerships (ex. logistics, AI, AR and VR)	<p>“Beh per esempio partnerships che riguardano la spedizione di oggetti dal venditore all'acquirente, partnership con società di trasporto e di logistica esterna, in modo da fornire trasparenza da una parte sui costi di spedizione, dall'altra dare facilità a chi è via di facilmente sapere quanto dovrà far pagare a chi acquista.” (3)</p> <p>“Offrire più servizi tali per cui queste gallerie possono rivolgersi a noi non soltanto per il contenuto che è fondamentale, la visibilità e la vendita, ma anche sotto altri fronti, vedi la logistica, quindi lo shipping, tutto quello che riguarda il trasporto delle opere.” (5)</p> <p>“La nostra intelligenza artificiale, ad esempio ti fa una selezione di opere in base a quello che tu clicchi in base al colore, in base a quello che stai scegliendo, ti aiuta a riconoscere l'immagine che scegli, a darti dei suggerimenti su qualcosa che potrebbe piacerti altrettanto.” (5)</p> <p>“Ci siamo assolutamente aperti al discorso delle gallerie virtuali piuttosto che delle fiere virtuali. Ed è un servizio che fa parte appunto di essere una piattaforma che offra dei servizi all'interno dell'arte. Una galleria, se vuole creare la sua galleria online, la sua galleria virtuale, con noi lo può fare.” (5)</p>
		Projects to improve online experience,	“C'è comunque la necessità di dare sempre più servizi ai nostri clienti, acquirenti e venditori. Quindi diciamo rimuovere sempre quelle barriere,

<i>AGGREGATE DIMENSIONS</i>	<i>SECOND ORDER THEMES</i>	<i>FIRST ORDER CONCEPTS</i>	<i>REPRESENTATIVE QUOTATIONS (Interview)</i>
		make the offer and how it is presented more transparent, automaticity in the recommended sale price, improved offer description	<p>rendere sempre più facile transare, acquistare o vendere online. Quindi è un investimento continuo nella piattaforma digitale e nei servizi che noi offriamo ai nostri clienti. Quindi è un lavoro incessante nel rendere sempre più facile, sempre più, diciamo friction-less in inglese, quello che vuol dire transare digitalmente. Quindi si guarda appunto all'esperienza digitale sulla piattaforma, alle partnership esterne su alcuni servizi che possono essere di utilità sia per gli acquirenti che per i venditori.” (3)</p> <p>“Al di là degli aspetti funzionali di tracciare le proprie vendite eccetera, ma anche quello di rendere sempre più trasparente e facile da consumarsi, insomma, come tipo di informazioni l'oggetto che proponiamo. Per esempio offrire la possibilità di offrire e presentare foto sempre migliori, non solo per la qualità fotografica, ma anche magari in un futuro, guidare chi presenta un particolare oggetto su come fare le foto in maniera migliore. Potrebbe esserci un futuro per alcuni video oggetti, la possibilità di magari di fare un'offerta 3D.” (3)</p> <p>“Guidare il venditore su qual'è il prezzo consigliato sull'oggetto stesso, che attualmente viene fatto dagli esperti ma potrebbe esserci anche in futuro un maggiore automatismo in base algoritmi, in base alle vendite precedenti che potrebbe guidarti su qual è la migliore strategia di prezzo al quale proporre.” (3)</p> <p>“E' stato implementato e fatto molto bene questa piattaforma che c'è in tutte le grosse case d'asta ed è il portale col quale tu carichi da solo le tue foto, chiedi la stima e noi ti rispondiamo. Noi abbiamo dietro l'ufficio con dei colleghi che allocano le richieste a livello geografico, a livello di tipologia di opere eccetera. Ma già con il questionario a cui tu rispondi mentre inserisci le tue foto già va all'esperto giusto. Quindi questo ha velocizzato e noi abbiamo fatto un sourcing notevole da questa piattaforma.” (6)</p>
Social Networks	Social Networks for art sales and promotion	Moving beyond the traditional path of the commercial art supply chain	<p>“Gli artisti si muovono sui social media in qualche modo, anche saltando il percorso tradizionale della filiera commerciale dell'arte che è quello, insomma della galleria d'arte, della fondazione, del curatore, eccetera.” (1)</p> <p>“Tantissimi artisti che mettono in vendita le loro opere direttamente su Instagram riescono magari a mantenere vivo quello che è il loro mercato senza</p>

<i>AGGREGATE DIMENSIONS</i>	<i>SECOND ORDER THEMES</i>	<i>FIRST ORDER CONCEPTS</i>	<i>REPRESENTATIVE QUOTATIONS (Interview)</i>
			bisogno di nessun altro.” (5)
		Essential for communication, promotion and visibility to an international audience	<p>“Credo siano molto utili, in quanto la notizia viene postata e letta dagli utenti interessati. I vantaggi sono l’immediatezza della notizia che raggiunge tante persone in poco tempo che poi possono richiedere ulteriori informazioni sull’asta e sulle opere proposte.” (2)</p> <p>“Direi che dal punto di vista social network si prestano bene per quanto riguarda la promozione di arti visive, dove anche ci sia una storia che riguarda emozione o un background particolare.” (3)</p> <p>“Questo ci permette di raggiungere una platea eterogenea e internazionale di possibili acquirenti.. i Social Network sono un punto chiave nella nostra comunicazione e promozione. Il vantaggio più grande che ne traiamo è sicuramente la possibilità di rimanere costantemente in contatto con chi ci segue.” (4)</p> <p>“La presenza online è stata completamente potenziata con la pandemia e anche sui social network, ti dico che per esempio noi non facciamo più pubblicità cartacee sui quotidiani o sul giornale dell’arte, facciamo solo online. Ormai la nostra parte di marketing e pubblicità è tutta praticamente online. Per cui già questo ti dà un pò il grado di misura di quanto sono importanti.” (6)</p>
		Useful for art sales and public edutainment	<p>“È molto importante sia lato galleria, sia la tua artista, sia lato piattaforma online come la nostra, che magari non solo vende opere, ma dà anche molte informazioni, in una forma di edutainment.” (5)</p> <p>“Nel senso di opere in vendita diretta, quindi, che hanno proprio quel simbolo Instagram con la borsetta che compri piuttosto che magari diamo visibilità a qualche galleria o qualche artista sempre che lavori con noi.” (5)</p>
	Diversification and investment in Social Networks	Diversification of platforms to reach more users (Instagram, Facebook, YouTube, TikTok, LinkedIn,	“Facebook rappresenta contenuti più approfonditi, più testuali che si portano dietro dei link. Con Instagram azzeriamo tutto e arriviamo al mondo fatto completamente di immagini immediate, semplice ma con un’attenzione di un secondo e mezzo. È quello che ci ha portato questo, non necessariamente ci porta in un mondo dove l’opera d’arte può essere privilegiata, proprio per questa visione estremamente consumistica dell’immagine. Per cui l’utente si

<i>AGGREGATE DIMENSIONS</i>	<i>SECOND ORDER THEMES</i>	<i>FIRST ORDER CONCEPTS</i>	<i>REPRESENTATIVE QUOTATIONS (Interview)</i>
		Twitter, Twitch, WeChat)	<p>sofferma in realtà poco. Ci sono altri approcci più interessanti come per esempio un social più video come YouTube, che ha una audience già selezionata che si sofferma per più di dieci/venti secondi. In quel senso si riesce ad approfondire il contenuto, che è una esigenza fondamentale all'interno del mondo dell'arte.” (1)</p> <p>“I più utilizzati sono senz’altro Instagram, Facebook e Twitter.” (2)</p> <p>“Per quanto riguarda noi, specificatamente direi Facebook ed Instagram, come fascia d'età 30+.” (3)</p> <p>“Nello specifico, un social network che troviamo particolarmente interessante e efficace è Wechat, che si rivolge al pubblico orientale e sul quale promuoviamo soprattutto opere di artisti vicini al loro gusto.” (4)</p> <p>“Poi ovviamente lato visibilità, ad oggi si stanno aprendo anche diverse cose, vedi Tik-Tok. Ho visto recentemente dei Tiktokers giovani promuovere opere, piuttosto che dare informazioni sul mercato dell'arte in maniera simpatica anche attraverso Tik-Tok.” (5)</p> <p>“Per noi LinkedIn, Facebook ed Instagram sono i mezzi che usiamo prevalentemente Instagram con una struttura importante.. Mentre Twitch sono molto d'accordo e anzi lo sto valutando today.” (5)</p>
		Strong investment, non-basic knowledge and original content needed to emerge in the market	<p>“Vero è che richiede appunto investimenti e conoscenze normalmente per raggiungere un pubblico sufficiente, non basilari. Quindi quello è il caveat.” (3)</p> <p>“Dal punto di vista negativo è che.. per far sì che un post raggiunga un sufficiente numero di audience, richiedono un investimento non indifferente.” (3)</p> <p>“Uno svantaggio potrebbe essere che essendo ormai sommersi da immagini e video, è una sfida costante farsi spazio nel mondo dei social in maniera originale.” (4)</p>
NFT and Blockchain	Positive vision of	Recovery of the	“Perché ogni sistema, ogni progetto, ogni artista in effetti fa capo a una

<i>AGGREGATE DIMENSIONS</i>	<i>SECOND ORDER THEMES</i>	<i>FIRST ORDER CONCEPTS</i>	<i>REPRESENTATIVE QUOTATIONS (Interview)</i>
	NFTs in the art market	relationship between artist and his community	community o un audience che cresce insieme a lui. Quindi anche questa è una cosa diciamo nuova e gradevole. Siamo abituati a un artista lontano, di cui a volte il collezionista non sa neanche che faccia abbia. C'è un distacco, uno scollamento tra chi colleziona, chi produce e poi attraverso il gallerista, eccetera. In questo caso un recupero di un legame diretto tra chi fruisce e quindi colleziona, interagisce e chi produce, quindi l'artista. Questa è una cosa impressionante. Ci sono artisti che si consultano con la propria community prima di un drop, prima di far uscire una collezione nuova per testare e capire un po' qual è il terreno, qual è il feeling della propria community, che ovviamente può essere più o meno determinante. Però diciamo l'artista è immerso nella propria community ed è immerso in una rete globale.” (1)
		Past speculation followed by a reset and new growth based on quality	<p>“In effetti c'era stata un'enorme speculazione. Era un mondo tenuto in piedi quasi esclusivamente da operazioni speculative. E sicuramente era meno interessante di quello che è oggi. Oggi possiamo dirlo perché questo tipo di bolla speculativa finanziaria è scoppiata. Il mercato ha avuto un enorme reset ed è come se fosse ripartito da zero, con un intento di ricerca della qualità.” (1)</p> <p>“E’ stata un'operazione speculativa di medio periodo che ha portato ad arricchirsi tantissime persone, ha portato sicuramente anche a spostare dei capitali di provenienza un pochino dubbia per un certo periodo. E poi tutto questo è impleso in questo reset e adesso sta crescendo un mondo nuovo di artisti nativi NFT, di artisti che vivono secondo la nuova logica della Blockchain e che hanno tantissima qualità, con una vivacità che nel mondo dell'arte contemporanea sinceramente si era persa da diverso tempo.” (1)</p> <p>“C'è stato un boom adesso, è stata un pò una bolla che è esplosa e anche noi ci siamo ritrovati ovviamente ad affrontare l'argomento NFT e capire se ci volevamo aprire a questo mondo.” (5)</p> <p>“Quindi noi investiamo molto in questa cosa, senza però una presenza ossessiva, ma facendo eventi pensati e ragionati con gli artisti. Insomma non vogliamo saturare il mercato, anche perché si è saturato subito da solo e poi è sceso a picco. Per cui bisogna che riparta dopo l'euforia del momento, in un modo pensato per cui c'è proprio un programma a lungo termine.” (6)</p>

<i>AGGREGATE DIMENSIONS</i>	<i>SECOND ORDER THEMES</i>	<i>FIRST ORDER CONCEPTS</i>	<i>REPRESENTATIVE QUOTATIONS (Interview)</i>
		Future consolidation as a new declination of art like sculpture, painting, photography	<p>“Personalmente, immagino che questo tipo di arte diventerà una delle nuove declinazioni (come la scultura, la pittura, la fotografia) a cui potranno accedere i collezionisti.” (4)</p> <p>“Credo anche che dureranno nel tempo perché de facto poi si collega anche al discorso del metaverso e una serie di cose per cui gli NFT avranno sempre più importanza e si consolideranno secondo me all'interno del mercato dell'arte indubbiamente.” (5)</p> <p>“Nessuno scredita gli NFT. Nessuno. Tuttavia ovviamente devono essere fatti in un certo modo, con certi criteri, per cui criteri non solo tecnologici, di sicurezza, ma anche proprio di contenuto. Noi abbiamo subito gestito gli NFT e abbiamo anche ormai un ufficio, una parte del dipartimento di arte contemporanea con alcuni nostri colleghi che fanno solo quello. Anche se poi tanti artisti si sono cimentati, continuano a cimentarsi. Quindi non è una moda del momento, è un mercato che ovviamente come tutte le cose nuove ha un momento di apice, di grande slancio iniziale, per poi assestarsi. Quindi deve trovare un pochino di spazio all'interno di quello che è l'arte digitale in generale.. Quindi si consoliderà e troverà una sua strada secondo me parallela.” (6)</p>
		Audience of investors of different ages who are passionate about finance and technology	<p>“Sicuramente a un certo punto la clientela di questo mondo erano soprattutto cripto investitori, quindi persone che già investivano in asset crypto. Quindi prevalentemente diciamo investitori finanziari, operatori finanziari o semplicemente investitori, oppure anche molti giovani che avevano investito in crypto per vie diverse, che erano entrati nel mondo.” (1)</p> <p>“Oggi i clienti che cercano queste cose sono, o smanettoni digitali di tutte le età, ma secondo me è più facile che siano persone nate negli anni settanta, piuttosto che ragazzi.. quindi questo mercato ancora una volta riguarda persone secondo me da una fascia di età dai quaranta ai sessant'anni, questo è stato il mio riscontro. Poi è chiaro che c'è un mercato fatto da ragazzi di piccolo collezionismo molto diffuso che è interessante.” (1)</p>

<i>AGGREGATE DIMENSIONS</i>	<i>SECOND ORDER THEMES</i>	<i>FIRST ORDER CONCEPTS</i>	<i>REPRESENTATIVE QUOTATIONS (Interview)</i>
			<p>“In effetti, diciamo tra i 20 e i 50 è un pubblico come età che può essere interessato a questo tipo di offerta.” (3)</p> <p>“Accanto ai giovani millennials che si approcciano all’arte per la prima volta, abbiamo registrato un interesse crescente da parte di collezionisti storici che amano accompagnare alle opere più classiche questa nuova forma d’arte.” (4)</p> <p>“Secondo me non è un discorso di giovane o vecchio, è un discorso che chi è interessato più all'arte dal punto di vista di investimento, è più interessato agli NFT.. Vi sono proprio secondo me due personalità diverse, non è tanto vecchio o giovane. Conosco tantissime persone che si sono affacciate al mondo NFT, ovviamente i più giovani sono più spinti per il semplice fatto che ovviamente sono più bombardati da queste informazioni, quindi sono più al corrente, ma all'interno del mondo dell'arte il discorso NFT è stato affrontato in tutte le età, in tutti i settori, quindi è più un discorso di tutti se ne informano perché tutti sappiamo che è imprescindibile, nel senso che è stata un'onda molto forte nel mondo dell'arte, non si può ignorare.. il collezionista d'arte rimane legato all'arte, mentre chi è interessato, magari chi non si è mai affacciato al mondo dell'arte in senso stretto, ma è un appassionato di finanza o tutt'altro, magari si trova o in tecnologia o in marketing.” (5)</p> <p>“Allora sui grossi nomi, appunto quelli che hanno fatto cifre altissime a New York, ci sono tantissimi giovani, ma è anche un tipo di pubblico di giovani rampanti bankers piuttosto che della Silicon Valley. C'è un bacino di persone che in Europa non sono così tante come in America e che sono proprio i destinatari di questo tipo di speculazione in positivo però, nel senso di queste fiammate. Per cui all'inizio sono stati quelli. Però abbiamo conosciuto anche alcuni collezionisti assolutamente classici.” (6)</p>
	Skepticism toward NFTs and adoption of Blockchain	Market with discrete results but not yet massive	<p>“Su alcune nicchie sicuramente avrà un futuro. Non credo che possa diventare al momento, ma è un giudizio personale, realisticamente un mercato enorme come invece è prospettato attualmente.” (3)</p> <p>“I risultati sono stati discreti, ma non così massivi da dire che è una tecnologia in cui investiremo in maniera sostanziale.” (3)</p>

<i>AGGREGATE DIMENSIONS</i>	<i>SECOND ORDER THEMES</i>	<i>FIRST ORDER CONCEPTS</i>	<i>REPRESENTATIVE QUOTATIONS (Interview)</i>
		Blockchain for transparency and authenticity of art	<p>“Il discorso NFT è stato un mezzo per arrivare poi a capire che in realtà volevamo proporre la certificazione in Blockchain. Quindi noi stiamo sviluppando una Blockchain per catalogare le opere d'arte, quindi per avere un registro delle opere d'arte all'interno della nostra Blockchain. Quindi quello che noi abbiamo detto è “allora mettiamo giù delle basi solide per cui domani, volendo, possiamo anche aprirci al mondo NFT.” (5)</p> <p>“L'opera che tu acquisti, nel momento in cui è registrata in Blockchain, conosci tutti i passaggi che quest'opera ha fatto. Diciamo che è una spinta fortissima verso la trasparenza in un mercato che è sempre stato fortemente opaco. Quindi anche le transazioni sono più sicure se avvengono in Blockchain, piuttosto che gli artisti, che si sa appunto a chi appartiene l'opera, si sa in che mani è passata. Diciamo che l'autentica è la spunta che in Blockchain dice che è stata fatta da quell'artista lì. Insomma è un grandissimo cambiamento, fondamentale nel momento in cui si vuole davvero un mercato dell'arte più trasparente.” (5)</p> <p>“Usare la tecnologia Blockchain per creare delle autentiche digitali, un certificato che rilascia la fondazione e l'archivio dell'artista. Siccome si perdono in continuazione e non c'è traccia, non ti ricordi chi era prima il proprietario, quello dopo o quello prima, così che tu in un chip hai tutta la storia dell'opera, chi ce l'aveva prima, chi dopo senza dover perdere il foglio.” (6)</p>
		Trend of the moment, dangerous market equal to emerging art	<p>“Finora non abbiamo ancora trattato gli NFT, secondo me è un trend del momento, ma è solo una mia opinione.” (2)</p> <p>“Sarà magari anche un mercato parallelo al mondo dell'arte molto pericoloso, nel senso che io paragono sempre gli NFT al mondo dell'arte emergente, quindi comprare un NFT oggi, a meno che non sia già molto rinomato come può essere una un'opera di Picasso, che non è quello il caso, perché ovviamente sono tutti nuovi. Il punto è che è comunque un atto speculativo, quindi non si sa realmente come andrà ed è lo stesso rischio che ci si prende un po' nel mercato dell'arte emergente fisico.” (5)</p>

<i>AGGREGATE DIMENSIONS</i>	<i>SECOND ORDER THEMES</i>	<i>FIRST ORDER CONCEPTS</i>	<i>REPRESENTATIVE QUOTATIONS (Interview)</i>
			<p>“Per noi la risposta è stata no, no ad aprirsi agli NFT perché ovviamente bisogna sapersi anche focalizzare sulle cose che si sanno fare. Se si cerca di diversificare troppo, poi ovviamente si rischiano degli scivoloni e noi non potevamo prenderci questo rischio. Appunto contando anche che il mondo stesso degli NFT è un rischio.” (5)</p>
Future Digital Scenario	Future experience with AR, VR and Metaverse	World dense with real and virtual information and noninvasive sensors	<p>“Vivremo in un mondo denso in cui siamo circondati da informazioni, diciamo reali e virtuali, che si intrecciano e avremo sempre più dei dispositivi che si interfacciano e tenderanno ad accorparsi.. ci troveremo in un mondo denso di iper collegamenti, di collegamenti iper reali, ovvero che ci portano fuori dalla realtà in mondi aumentati o lontani che si intrecciano con noi, si interfacciano alla nostra sensorialità attraverso dei dispositivi che, ripeto dovranno diventare sicuramente meno invasivi dei vari visori o anche degli occhiali avveniristici che stanno in questo momento sviluppando.” (1)</p>
		Early stage in the development of devices and sensory usability in Metaverse, AR and VR	<p>“Secondo me è ancora molto all'inizio in termini di sviluppo, in termini di dispositivi, in termini di fruibilità.. per i veri metaversi, la vera fruizione da un punto di vista sensoriale del VR, deve ancora arrivare e arriverà.” (1)</p> <p>“Comunque il nostro sito Metaverse esiste già. C'è il sito perché è proprio il luogo dove noi vendiamo gli NFT.” (6)</p>
		Empowerment of physical experiences with the option of choosing a superficial virtual or in-depth physical experience	<p>“E' interessante il fatto che oggi si possa scegliere a che livello vedere una mostra, se vederla in maniera superficiale, vederla in maniera virtuale, se venire in maniera approfondita a vederla fisicamente. Probabilmente questo ci darà l'opportunità di valorizzare le nostre esperienze fisiche, come un qualcosa di più prezioso.” (1)</p>
	Democratic, sustainable and open source world	Advent of Web 3.0 to reclaim ownership of content, become players in a decentralized and open	<p>“La rivoluzione tra web 2.0 a 3.0 laddove gli utenti recuperano la proprietà dei propri contenuti e si interfacciano col resto della rete, rivendicando i propri profitti. Quindi, in sostanza, l'avvento dei wallet permette agli utenti, questa volta di essere protagonisti attivi e in un mondo decentralizzato, senza dei player centrali che controllano e approfittano su tutto. Ogni utente è proprietario del proprio mondo, dei propri contenuti, delle proprie opere e può</p>

<i>AGGREGATE DIMENSIONS</i>	<i>SECOND ORDER THEMES</i>	<i>FIRST ORDER CONCEPTS</i>	<i>REPRESENTATIVE QUOTATIONS (Interview)</i>
		source world	<p>ricavarne liquidità in maniera immediata, decentralizzata, senza passare da intermediari centrali.” (1)</p> <p>“Nel web 2.0 gli utenti sono entrati nella rete come creatori di contenuti, però i contenuti alla fine appartenevano sempre a questi colossi come Facebook, Twitter, eccetera. E’ un mondo fatto di de-centralizzazione: no Microsoft, Twitter, Facebook, Google, eccetera. Quello che sta avvenendo oggi è un ritorno verso un mondo open source, dove l’utente è padrone dei propri contenuti, padrone della propria navigazione. E i contenuti sono aperti, ogni utente può dare il proprio contenuto alla modifica. E sicuramente una cosa che ci ha insegnato la storia dell’informatica è che i sistemi aperti open source funzionano meglio di quelli chiusi.” (1)</p>
		Combination of digitalization and sustainability	<p>“Il nostro impegno verso la digitalizzazione va di pari passo con “La digitalizzazione, come dicevo prima, è un processo che va incontro ad alcuni elementi fondamentali come la sostenibilità.. non avrei bisogno di andare a Londra per vedere una mostra. Te la potrai vedere in maniera immersiva, magari sulla tv di casa o semplicemente sui tuoi occhiali.” (1)</p> <p>“L’impegno ecologico: abbiamo ridotto il numero di cataloghi e di pubblicazioni cartacee proprio per evitare un consumo eccessivo di carta. Al momento, i cataloghi in PDF sono molto più pratici e apprezzati anche dai clienti, facilmente inoltrabili con whatsapp o via email.” (4)</p>
		Democratization of art globally and elimination of large subjects and barriers to entry	<p>“E’ un processo di democratizzazione incredibile, perché nei conti, in qualunque parte del mondo, anche chi non può permettersi addirittura l’istruzione, sempre con una diffusione di mezzi e dispositivi più capillare, si darà la possibilità di crescere anche a quelli più sfortunati, di farsi una cultura visiva.” (1)</p> <p>Oggi la curva gaussiana diciamo potrebbe abbassarsi, per cui la distribuzione dei profitti, la visibilità delle opere dell’audience e dell’attenzione si può veramente ridistribuire secondo una logica più organica. Per cui tu che sei un artista diciamo che vale qualcosa, hai più probabilità di uscire di prima quando dovevi passare da galleria, critica, fondazione di un certo tipo, e questi magari sceglievano due da lanciare e su cui speculare per un anno.” (1)</p>

<i>AGGREGATE DIMENSIONS</i>	<i>SECOND ORDER THEMES</i>	<i>FIRST ORDER CONCEPTS</i>	<i>REPRESENTATIVE QUOTATIONS (Interview)</i>
			<p>“L'arte è stata tradizionalmente vista come un qualcosa più di elitario o a cui guardare sempre con la titubanza con cui le persone possono entrare magari in una galleria d'arte. Quindi l'aspetto digitale permette comunque di democratizzare l'accesso all'arte stessa. Dal punto di vista di chi offre arte, sicuramente è uno strumento che permette a molte più persone, a molte più artisti di far conoscere la propria creazione, di creare la propria creazione. Per essere esposto in una galleria d'arte che abbia una qualche importanza, attualmente le barriere d'ingresso sono enormi. Le barriere di ingresso invece per farsi conoscere a livello digitale sono molto più basse.” (3)</p> <p>“Il nostro scopo è quello di portare l'arte all'interno della tua vita, quindi di accompagnarti in questo percorso che ti dovrebbe aprire, anche per democratizzare quello che è il mondo dell'arte e aiutare le persone a capire cosa stanno facendo, assecondarle.” (5)</p>

Bibliography and sitography

Akron, 2020. Akron Art Museum Launches Interplay: Art Play for All Augmented Reality Experience. Akron Art Museum [online], 1 (1). Available at <<https://akronartmuseum.org/newsroom/akron-art-museum-launches-interplay-art-play-for-all-augmented-reality-experience/>>

Appel, G., Grewal, L., Hadi, R., Stephen, A. T., (2020). The future of social media in marketing. *Journal of the Academy of Marketing Science*, 48, 79–95.

Beard, E., 2018. The four types of art collectors. Artsy [online], 1 (1). Available at <<https://www.artsy.net/article/evan-beard-four-tribes-art-collectors>>

Bialynicka-Birula, J. (2021). Investment in Art-Specificity, Risks, and Rates of Return. *Risks, and Rates of Return (May 6, 2021)*.

Bozzo, G., 2021. VR & NFT: il futuro dell'Arte. Meetcenter [online], 1 (1). Available at: <<https://news.artnet.com/market/first-ever-artificial-intelligence-portrait-painting-sells-at-christies-1379902>>

Brennen, J. S., & Kreiss, D. (2016). Digitalization. *The international encyclopedia of communication theory and philosophy*, 1-11.

Brian, H., Brunschwiler, T., Dill, H., Christ, H., Falsafi, B., Fischer, M., ... & Zollinger, M. (2008). Cloud computing. *Communications of the ACM*, 51(7), 9-11

Caines, M., 2014. Arts head: Joe Kennedy and Jonny Burt, co-founders, The Unit London. The Guardian [online], 1 (1). Available at: <<https://www.theguardian.com/culture-professionals-network/culture-professionals-blog/2014/sep/16/the-unit-london-gallery-art-interview>>

Casino, F., Dasaklis, T. K., & Patsakis, C. (2019). A systematic literature review of blockchain-based applications: Current status, classification and open issues. *Telematics and informatics*, 36, 55-81.

Cetinic, E., & She, J. (2022). Understanding and creating art with AI: Review and outlook. *ACM Transactions on Multimedia Computing, Communications, and Applications (TOMM)*, 18(2), 1-22.

Džikić, V., & Radin, M. (2019). Digital Technologies in Conservation of Cultural Heritage: Digitization and Values. *Преглед ИИИ*, 34, 39-48

El Miedany, Y. (2019). Virtual reality and augmented reality. In *Rheumatology Teaching* (pp. 403-427). Springer, Cham.

Emem, M., 2018. Andy Warhol's Multi-Million Dollar Painting Tokenized and Sold on Blockchain. Yahoo Finance [online], 1 (1). Available at: <<https://finance.yahoo.com/news/andy-warhol-multi-million-dollar-162928721.html>>

Evans, D.S. and Schmalensee, R. (2013): The Antitrust Analysis of Multi-sided Platform Businesses. Paper No. 623. The Law School, The University of Chicago.

Fernandes, Alexandra, and Luís U. Afonso. 2020. "Online Sales and Business Model Innovation in Art Markets: A Case Study" *Social Sciences* 9, no. 2: 7.

Formlabs, 2018. How 3D Printing Brings Antiquities Back to Life. Formlabs [online], 1 (1). Available at: <<https://formlabs.com/blog/how-3d-printing-brings-antiquities-back-to-life/>>

Foss, N. J., & Saebi, T. (2018). Business models and business model innovation: Between wicked and paradigmatic problems. *Long range planning*, 51(1), 9-21.

Franceschet, M., Colavizza, G., Finucane, B., Ostachowski, M. L., Scalet, S., Perkins, J., ... & Hernández, S. (2021). Crypto art: A decentralized view. *Leonardo*, 54(4), 402-405.

Frankiewicz, B., & Chamorro-Premuzic, T. (2020). Digital transformation is about talent, not technology. *Harvard Business Review*, 6(3).

Gartner IT Glossary, 2022. Digitalization. Gartner [online], 1 (1). Available at: <<https://www.gartner.com/en/information-technology/glossary/digitalization#:~:text=Digitalization%20is%20the%20use%20of,moving%20to%20a%20digital%20business>>

Gérard-Varet, L. A. (1995). On pricing the priceless: Comments on the economics of the visual art market. *European Economic Review*, 39(3-4), 509-518.

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2013). Seeking qualitative rigor in inductive research: Notes on the Gioia Methodology. *Organizational Research Methods*, 16(1), 15–31

Goran, J., LaBerge, L., & Srinivasan, R. (2017). Culture for a digital age. *McKinsey Quarterly*, 3(1), 56-67.

Graziano, A., 2022. BOOMing Art Show lands in the Metaverse. Close-Up art [online], 1 (1). Available at: <<https://closeupart.org/booming-art-show-sbarca-nel-metaverso/>>

Gulati, R., & Reaiche, C. H. (2020). Soft skills: A key driver for digital transformation. In *The Fourteenth International Conference on Digital Society* (pp. 40-43).

Gupta, M. S., 2020. What is Digitization, Digitalization, and Digital Transformation? Arc Advisory Group [online], 1 (1). Available at: <<https://www.arcweb.com/blog/what-digitization-digitalization-digital-transformation>>

Hagiu, A., & Wright, J. (2015). Multi-sided platforms. *International Journal of Industrial Organization*, 43, 162-174.

Heilbrun, J., & Gray, C. M. (2001). *The economics of art and culture*. Cambridge University Press.

Hiscox. Hiscox Online Art Trading Report 2021. Available at: <https://www.hiscox.co.uk/sites/default/files/documents/2021-10/21674a-Hiscox_online_art_trade_report2021-part_one_1.pdf>

Investimenti magazine, 2021. Sotheby's Metaverse: What it is and How it works. Investimenti magazine [online], 1 (1). Available at: <<https://www.investmentimagazine.it/sothebys-metaverse-cose-e-come-funziona/>>

ITU Publications, 2021. ITU [online], 1 (1). Available at: <https://academy.itu.int/sites/default/files/media2/file/21-00668_Digital-Skill-Insight-210831_CSD%20Edits%206_Accessible-HD.pdf>

Kinsella, E., 2018. Yusaku Maezawa's Blockbuster \$110.5 Million Basquiat Is Getting Its Own Brooklyn Museum Show. Artnet [online], 1 (1). Available at: <<https://news.artnet.com/art-world/yusaku-maezawas-blockbuster-basquiat-gets-show-brooklyn-museum-1194494>>

Kinsella, E., 2018. The First AI-Generated Portrait Ever Sold at Auction Shatters Expectations, Fetching \$432,500—43 Times Its Estimate. Artnet [online], 1 (1). Available at: <<https://news.artnet.com/market/first-ever-artificial-intelligence-portrait-painting-sells-at-christies-1379902>>

Kotler, P. (2017). Marketing 4.0: moving from traditional to digital. *Marketing 4.0*, 1-168.

Leavell, J. P. (2016). Motivations in the fine-art market: A self-determination theory approach. *Atlantic Marketing Journal*, 5(2), 9.

Lena, J. C., & Lindemann, D. J. (2014). Who is an artist? New data for an old question. *Poetics*, 43, 70-85.

Lindgardt, Z., Reeves, M., Stalk, G., & Deimler, M. S. (2009). Business model innovation. *When the Game Gets Tough, Change the Game, The Boston Consulting Group, Boston, MA*, 118.

Little-Tetteh, K., & Shchyhelska, H. (2019). Artificial intelligence painting: is it art, really?. *Збірник тез II Міжнародної наукової конференції молодих учених та студентів „Філософські виміри техніки “*, 73-75

Maltby, D. (2011, October). Big data analytics. In *74th Annual Meeting of the Association for Information Science and Technology (ASIST)* (pp. 1-6)

Mamarbachi, R., Day, M., & Favato, G. (2020). Art as an alternative investment asset. *Available at SSRN 1112630*.

Mark A. Reutter, Artists, Galleries and the Market: Historical Economic and Legal Aspects of Artist-Dealer Relationships, 8 Jeffrey S. Moorad Sports L.J. 99 (2001).

Mell, P., & Grance, T. (2011). The NIST definition of cloud computing.

Mills, S., Lucas, S., Irakliotis, L., Rappa, M., Carlson, T., & Perlowitz, B. (2012). Demystifying big data: a practical guide to transforming the business of government. *TechAmerica Foundation, Washington*.

Modena, E., Pinotti, A., & Pirandello, S. (2021). Virtual Reality and Augmented Reality: New Tools for Art and Politics. *Paradigmi*, 39(1), 87-106.

Montero, G. G. (2012). Biennialization? What biennialization? The documentation of biennials and other recurrent exhibitions. *Art Libraries Journal*, 37(1), 13-23.

Morgan, J. P. (2022). Opportunities in the metaverse. Available at: <<https://www.jpmorgan.com/content/dam/jpm/treasury-services/documents/opportunities-in-the-metaverse.pdf>>

Nadaraja, Rubatheer & Yazdanifard, Assoc. Prof. Dr. Rashad. (2013). SOCIAL MEDIA MARKETING: ADVANTAGES AND DISADVANTAGES. *Journal*, 1(1), 1-11.

Nadini, M., Alessandretti, L., Di Giacinto, F., Martino, M., Aiello, L. M., & Baronchelli, A. (2021). Mapping the NFT revolution: market trends, trade networks, and visual features. *Scientific reports*, 11(1), 1-11.

O'hagan, J. W. (1998). Art museums: Collections, deaccessioning and donations. *Journal of Cultural Economics*, 22(2), 197-207.

Paul, C. (2002). Renderings of digital art. *Leonardo*, 35(5), 471-484.

Parvinen, P. (2020). Advancing data monetization and the creation of data-based business models. *Communications of the association for information systems*, 47(1), 2.

Poli, F., Il sistema dell'arte contemporanea: produzione artistica, mercato, musei, Roma-Bari, Laterza, 2011.

Prakash, K. S., Nancharaih, T., & Rao, V. S. (2018). Additive manufacturing techniques in manufacturing-an overview. *Materials Today: Proceedings*, 5(2), 3873-3882.

Robertson, I. (2005). The international art market. In *Understanding international art markets and management* (pp. 29-52). Routledge.

Rogers, D. L. (2016). *The digital transformation playbook: Rethink your business for the digital age*. Columbia University Press.

Rusyada, G. N., & Sutiyono (2021). *Art and Social Media: Art Transformation in the Viral Era*. Atlantis Press, 29-32.

Schneider, F., & Pommerehne, W. W. (1983). Analyzing the market of works of contemporary fine arts: An exploratory study. *Journal of Cultural Economics*, 41-67.

Schumpeter, J. (1911) *Theorie der wirtschaftlichen Entwicklung*, 1

Sidorova, E. (2019). "The Cyber Turn of the Contemporary Art Market". *Arts* 8, no. 3: 84.

Smithsonian Magazine, 01/2015 [online]. Available at <https://www.smithsonianmag.com/innovation/kevin-ashton-describes-the-internet-of-things-180953749/> [Access data: 03/07/2022].

Sol, P., 2021. Christie's debutta nelle criptovalute: con 69,3 milioni di dollari è record per l'arte digitale. *Il Sole 24 Ore* [online], 1 (1). Available at: <https://www.ilsole24ore.com/art/christie-s-debutta-criptovalute-693-milioni-dollari-e-record-l-arte-digitale-ADwogoPB>

Stolterman, E., & Fors, A. C. (2004). Information technology and the good life. In *Information systems research* (pp. 687-692). Springer, Boston, MA.

Teece, D. J. (2010). Business models, business strategy and innovation. *Long range planning*, 43(2-3), 172-194.

The Art Market 2022, 2022 [online]. Available at: <https://www.artbasel.com/about/initiatives/the-art-market>

Towse, R., & Hernández, T. N. (Eds.). (2020). *Handbook of cultural economics*. Edward Elgar Publishing

Treccani, 2022. Arte. Treccani [online], 1 (1). Available at: <https://www.treccani.it/vocabolario/arte/> [Access data: 03/07/2022].

Yin, S., & Kaynak, O. (2015). Big data for modern industry: challenges and trends [point of view]. *Proceedings of the IEEE*, 103(2), 143-146.

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