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THE DISTRIBUTED LEDGER TECHNOLOGY FOR THE ART MARKET

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Abstract

The art market seems exclusive to a limited circle of collectors due to information imbalances regarding artworks and their value. Often, one must turn to experts and auction houses to finalize a deal. In addition to artistic advice, legal consultations are also necessary, often due to third-party claims on the ownership of the artwork or cases of fraud. This article aims to explore the potential advantages of utilizing distributed ledger technology in the art market to verify and record transactions involving whole or parts of artworks, making them traceable and perhaps more easily purchasable.

Keywords: right of ownership, contractual law, commercial law, digital regulation, blockchain, NFTs, registration system, art market

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Introduction

Property constitutes the main manifestation of wealth, noble families would flaunt estates, towers, and artistic assortments as a testament to their wealth and, thereby, their authority, economic sway, and political influence. Being subject to conflicting desires and interests, ownership often became a matter of disputes. Thus, alongside the necessity of acquiring property, there arose the need to defend it. The instability of possession led to the development of transfer mechanisms that ensured the security of one's title, without relying exclusively on the use of force (Bocchini, 2022, p. 370). The assurance of ownership marked the initial stride toward economic advancement, as it enabled individuals to focus not on safeguarding their land, but on acquiring and working with other resources and assets. It is precisely due to the intimate link between property and personal dignity, where it's seen as an extension of one's personality, that the regulation of its transfer must be assessed while upholding all the safeguards surrounding it. This premise is relevant in introducing the sensitivity of the subject under analysis, digitization of transcription systems.

Hence, civil legal systems have mandated specific procedures and formalities to safeguard the transfers of significant assets such as real estate, automobiles,

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and ships. Indeed, a mere private document, does not achieve the highest degree of certainty, as it can be contested in court. Therefore, parties seeking to finalize a purchase with the highest assurance turn to the figure of a notary. The latter, as a public official, will ensure the accuracy of the statements, made in their presence, the identity of the parties, the proper documentation of the sale, and the drafting of a contract that aligns with the parties' intentions. Furthermore, the notary alone is authorized and obligated to record the deed in the land registry. From the described regulations, it becomes clear that certainty forms the core of real estate regulations.

The safeguarding of property rights is a crucial consideration for investors, as a clear title will not be subject to disputes, investigations, or disruptions. An increase in demand for a property within a specific country would elevate the value of the real estate market and, consequently, the country's overall wealth. Thus, the management of the system for registering property transfer deeds stands as a key influencing factor in the economic development of the country. Challenges and uncertainties create a tough business environment. To make things better, it's important to not only share the idea of preserving what we have with those who aren't familiar with it, but also to use methods that have already been tried and tested by legal systems that have experience with using new technologies. With this aim, this article seeks to explore the feasibility of leveraging distributed ledger technology as a means to support the transcription of art transfer deeds, that currently lack a secure and shared system for recording transfers. It also investigates its compatibility with legal values such as public trust, legal certainty, the fundamental right to privacy, and constitutional property rights.

The features of blockchain technology

Blockchain technology supports a shared digital ledger composed of sequenced and linked blocks, forming a chain. The primary characteristics of this technology include the immutability of blocks and the absence of a central authority on which the management and utilization of the platform depend. It is a distributed ledger as the chain's blocks are distributed to all nodes, creating a ledger with each administrator. Parties who want to add their transactions to a blockchain will connect using cryptographic keys. The technology relies on asymmetric encryption, where one party shares a message and uses the public key to encrypt the text, while the private key can decrypt it. Data encryption ensures the immutability and integrity of information. In blockchain, an additional mechanism is introduced to link the blocks together, known as the consensus mechanism or 'Proof of Work'. Literally, Proof of Work involves actual computational effort by miners. The miner who first solves the computational puzzle presented by

the blockchain notifies others of the validation and adds the block to the chain. Miners aim for the reward in Bitcoin or any other cryptocurrency (Krishnapriya, Greeshma, 2020). Other validation techniques include Proof of Stake, which assigns the validation distribution among the platform's major shareholders, responsible for adding blocks and receiving rewards. Lastly, Proof of Authority legitimizes nodes through authorization granted by an administrator. As we will see, the choice of the validation mechanism will also determine the type of usable blockchain. The block is composed of the set of transaction data, parties, and the subject, along with an alphanumeric code known as a hash that identifies that specific block. The hash code is always unique, like a digital fingerprint of the block, closely tied to the block's content. In fact, if the content were to change, the hash would change as well. The block also contains the hash of the previous block; it's this connection that makes the set of blocks an immutable chain. Tampering with a block would result in a change in the hash of the subsequent block.

The innovation brought about by blockchain also lies in the absence of an authority to manage it. The platform is, in fact, entrusted to miners, who work to validate transactions and authorize the addition of blocks to the chain through majority consensus. Thus, the system allows for contracts to be concluded 'publicly'. Of course, the agreement could have been privately finalized beforehand and later digitally preserved through the blockchain. Indeed, the purpose of blockchain is to ensure data preservation on the web through a distributed ledger among all participants. This way, sharing a document replaces the need to rely on an institution for this task. This goal is fully achieved when the digital representation of a real asset is also transferred using blockchain. In such cases, it would be easy to verify the rightful owner as well as all previous transfers.

Blockchain as a public ledger

The transcription is a legal instrument that serves a dual purpose: being a storage of the legal status of real estate properties and a way to make deeds public, transferring or modifying of a real right on an immovable property, as well as all judicial acts, provisions, or requests for which the law requires transcription. Thanks to transcription, public deeds are presumed to be known by the community, thereby making them enforceable. Thus, the registration system enables the public disclosure of the legal status of properties, indicating the owner, holders of any encumbrances, and all previous owners, making the process of searching for information about the property for sale straightforward and institutionalized. The *ratio* of the system is thus found in the "overarching principles of safeguarding the security inherent in the circulation of assets and in the reliance of third parties, particularly creditors and successors, on the original debtor" (Italian Supreme

Court, Sentence n° 30625 of 27 Nov. 2017). The document eligible for transcription can be a court judgment, a public deed, or an authenticated private writing. The public ledger can guarantee the certainty of transactions only if the information in it is correct. To guard the truthfulness and correctness of the registered deeds, the notary has the task of:

1. ascertaining the will of the parties;
2. advisory activities in the drafting of the deeds;
3. assistance in the conclusion of the public deed.

Thanks to the controls performed by the notary in Italy, there is essentially no litigation on real estate transactions (only 0.003% creates to litigation[2]). Therefore, it would be possible to ensure the same level of security in commercial transactions for other goods, also characterized significant socioeconomic importance.

It is worth noting that in Italy, the only regulatory reference to this technology is contained in Article 8ter of the Law 12/2019, in which it acknowledged all those systems that enable the registration, validation, updating, and storage of data, both in clear form and further protected by verifiable encryption, and which remain unaltered and unmodifiable by each participant. Nevertheless, the practical impact of this regulation has been hindered by the lack of guidelines from AGID[3]. As of today, the provision remains devoid of the necessary technical clarifications (Rigazio, 2021, p. 369). On a European level, however, the Commission initiated the EU Blockchain Observatory and Forum, the International Association for Trusted Blockchain Applications (INATBA), and the Interoperable Standards for DLT and Blockchains. The Commission's goal is to facilitate the establishment of a pan-European blockchain for public services, achieved through the European Blockchain Services Infrastructure (EBSI)[4]. This regulation highlights the significance of creating a block on the blockchain as a digital parallel to the transaction recording process, resulting in the temporal validation of the operation's date. It's akin to presenting oneself before a public official.

Distributed ledger for the art market

The acquisition of artworks often demands research, the involvement of an aucti1on house, and bidding at auction. These processes are essential due to the close connection between the history of the artwork and its value, elements

[2] Consiglio Nazionale del Notariato, Notaio sicurezza giuridica sviluppo economico.

[3] The Agency for Digital Italy (AgID) is the technical agency of the Presidency of the Council, it has the task of guaranteeing the realization of the objectives of the Italian Digital Agenda.

[4] The European blockchain services infrastructure (EBSI) consists of a peer-to-peer network of interconnected nodes running a blockchain-based services infrastructure. Each member of the European Blockchain Partnership (EBP) – the 27 EU countries, Norway, Liechtenstein and the European Commission – will run at least one node.

known only by experts in the field, resulting in the art market frequently being inaccessible to the majority of the public. If a platform existed that enabled the purchase of artworks with certainty not only about the author but also about all the transfers it has undergone, it would open the door to a thriving art market, one that has so far been restricted to collectors and experts. So, currently, to acquire a significant artwork, one must possess substantial financial means to cover not only its economic value but also the relevant information necessary to verify its origin and the legitimacy of its transfer. In fact, if a painting were to be found stolen, it would be returned to the rightful owner with little hope for the buyer of recovering its price. This reality has always deterred small investors from the art market, which, on the contrary, could represent a significant investment opportunity. A financial art market would have multiple positive effects, especially because it is closely tied to the real economy, unlike traditional financial instruments. It would also encourage many more artists and young talents to direct their efforts towards a genuinely regulated career path in the art field. Furthermore, an artwork would hardly lose its value; on the contrary, it could also yield civil fruits by being displayed to the public without the risk of it being damaged or 'consumed'.

As previously mentioned, the first step towards developing a market is its regulation and the desirability of the offered assets. Both of these aspects can be enhanced through the reduction of disputes arising from the difficulty in obtaining accurate information about the artwork's history and authenticity (Bufano, 2021, p. 100). A registry would thus help to lower transaction costs and to specify the requirement of good faith as outlined in Article 1153 of the Italian Civil Code, which finalizes the purchase of movable property for those who possess an abstractly suitable title for ownership transfer, even if the seller wasn't the rightful owner. Using a blockchain, the buyer could demonstrate their good faith by simply stating that they acquired the artwork from the individual listed as the owner in the registry (Caloni, 2022, p. 181). These were the objectives that drove the legislator to introduce regulations on distributed ledger technology, recognizing legal value in the timestamp that the blockchain would assign to each operation. However, this rule did not ensure absolute certainty of transactions, which could only be achieved with a registry that also guarantees the truthfulness of information; otherwise, there would always be a need for intermediaries to search for information.

Blockchain for the traceability of artwork: the structure

An effective blockchain for the art market should capture all events related to the artwork: creation, restorations, changes of ownership, as well as photos and videos documenting the artwork. The method of inputting information and its reliability will depend on the authors and the type of artwork. Indeed, the artworks

could be registered directly by the artists at the time of their creation. In the case of older artworks or deceased artists, institutional entities should be involved to ensure the authenticity of the artwork, as mandated by Article 144 of the copyright law, which stipulates that "a subsequent sale is defined as any transaction that involves the participation, whether as sellers, buyers, or intermediaries, of individuals or entities operating professionally in the art market, such as auction houses, art galleries, and, in general, any art dealer". Once the duly supported information is gathered, it must be translated onto a digital platform capable of being involved in transactions yet not duplicable. Otherwise, the security benefits achieved through the registry could easily be negated by duplicating the digital representation of the artwork. The means enabling the creation of an asset in the digital space is the token. In fact, these are regarded as second-order assets linked to a digital or real performance or wealth. The most well-known token is indeed Bitcoin, a digital currency exchanged through the Ethereum blockchain, its value tied to the market demand for Bitcoin, similar a regular currency. It's important to underline that the blockchain enables the transfer of tokens "which represent a specific value or the right to use a service/asset". That characteristic enables to transfer NFTs (Not Fungible Tokens), which constitutes the tangible artwork with cryptocurrencies or other value or services. NFTs can encompass both physical and native digital artworks. In the latter case, the NFT itself will be covered by copyright, as it coincides with the artwork. Conversely, when dealing with physical works, the NFT solely serves as a means of economic utilization of the artistic creation, as its utility is confined to a tool for transferring rights to the asset. The NFT, combined with the metadata pertaining to the artwork, allows for the concept of scarcity inherent in non-fungible assets to be replicated within the digital world (Muciaccia, Lopopolo, 2022, p. 893). Clearly, it will be necessary to link the physical artwork to the corresponding NFT on the blockchain. The solution that garners the most attention involves affixing a QR code to the artwork for asset tracking. However, this solution is vulnerable from a security standpoint, as the code could be tampered with or counterfeited. Another set of issues involves the possibility that the artwork circulates on different blockchains, carrying inconsistent information; for example more NFT for the same work could recognize conflicting property rights. Added to this risk factor there is the so-called 'blockchain air gap', which refers to the risk that the information conveyed by NFTs may not correspond to the physical or legal status of the artwork (Magri, 2019, p. 182).

Blockchain: permissionless, permissioned or hybrid

The transaction validation method and the miners' access method distinguish the two main types of blockchain: the public blockchain where anyone can take on the role of node and validate a transaction, and the private one which, instead, is based on the pre- and authorization of miners hired by the platform. These two types are more commonly referred to as permissioned and permissionless blockchains, distinguished by whether miners need permission to engage in transactions and block creation (Kaczorowska, 2022, p. 343). The most common type of blockchain is the public one, where anyone can contribute to the transaction chain through either proof of work or proof of stake. The anonymity of miners and the absence of a central authority make the localization of operations and miners uncontrollable as well. This does not allow for the establishment of the individuals responsible and the jurisdiction in case of misconduct. The issue of responsibility becomes relevant due to the difficulty of ensuring that what is recorded in the chain corresponds to the physical and legal status of the asset. Additional risks are linked to the possibility of tampering, malfunctions, or data breaches, which could be caused by any anonymous node.

On the contrary, the permissioned blockchain would enable the knowledge of miners' identities, allowing for greater control, transparency, and, most importantly, the ability to verify that the nodes are institutional entities, public officials, or specialized private entities. This oversight is essential to build market trust since nobody would entrust their transaction and assets certified by a ledger managed by strangers. Control measures could potentially grant access to the national judicial or administrative authority that has issued an order related to the artwork embedded in the NFT or the transaction carried out through the blockchain. Furthermore, a public blockchain could serve as an open field for fraud, money laundering, and a new tool to facilitate tax evasion (Bechini, 2018, p. 1181).

Therefore, having a responsible manager overseeing the chain would address the security and reliability shortcomings of the public blockchain. Additionally, if this role were entrusted to institutional entities such as the Public Administration or public officials like notaries, who provide public assurance to transactions and certified works. However, the establishment of art registries managed by Public Administrations should be avoided as it would necessitate the issuance of regulations governing this new administrative function, fragmenting the art market. Therefore, the preferred solution is to leave the service to private initiative, for which we already have examples like Artory, an online platform that records artworks in a permanent catalogue submitted by users who remain anonymous. However, artworks must be authenticated by qualified partners, in fact one of the major Artory partners is Christie's (Bufano, 2021, p. 100) auction house. A third compromise approach is to use a hybrid blockchain to leverage the features of an

open-access blockchain and one that requires specific qualifications and authorization for access.

Finally, a private or hybrid blockchain would enable compliance with the principles outlined in the GDPR, or EU Regulation 679/2016, that provides for protection of natural persons in relation to the processing of personal data, in fact the rule has established the right to the protection of personal data as a fundamental right. The regulation also aims to reach a safety digital internal market imposing to all digital product and service, that involve the processing of personal data, to respect the principles of transparency and of the free consent of the data subject. According to GDPR anyone who is processing personal data for professional purposes has to provide a series of information to their clients: the data controller's identity, the purposes and duration of data processing, and data retention policies. To which additional principles should be added, which, on the other hand, are not easily suited to the structure of the blockchain, such as the right to request data modification or deletion. Information about data controllers and processors also may not be obtainable from a public blockchain where miners are anonymous. At the same time, the anonymity of miners would also render the information about data processing unreliable because it would be provided by irresponsible and untraceable individuals. Instead, regarding the methods of data recording in compliance with GDPR, one could consider using an external server, located outside the blockchain, and referencing it through a hash present on the block.

Conclusion

Blockchain in the art market has already facilitated significant developments, such as the emergence of native digital artworks or crypto art, which were previously undervalued due to the ease of infinitely duplicating digital content, rendering it devoid of value. The image file associated with a token and transferred via the blockchain is indeed unique and embodies the concept of scarcity, typical of non-fungible assets, allowing the "ius excludendi omnes alios" (the right to exclude others) even in the digital environment. NFTs that incorporate artworks gain value and also become an important financial tool, as they enable the fractional sale of the artwork by dividing it into different NFTs. In this way, it will be possible, for example, to purchase ¼ or smaller fractions of famous artworks, making their purchase accessible even to small investors. Investing in art would become easy and cost-effective: easy thanks to the blockchain and cost-effective, because the investment value would not depend on the volatility of the stock market but rather on the history and characteristics of the artwork, which are objective and more stable factors. To facilitate investments for inexperienced investors, it could be beneficial to associate Artificial Intelligence with the blockchain

to develop predictive models regarding the use of the asset and its value trends over time (Veuger, 2020). This technology would make information more accessible and stored in a format and on a platform recognized by the legal system, hence admissible in court as evidence. The goal is to achieve a level of certainty and security in the real estate market similar to the one where there is essentially no litigation on real estate transactions (only 0.003%).

This result cannot be achieved with blockchain alone, as it can only certify the timestamp of a transaction. It must also provide a service for verifying the identity of the parties, the legitimacy of the actions, and the identity of the parties involved. Such a service could easily be provided by public officials who already perform this function for the transfer of rights in registered real estate and movable property. In fact, it is unrealistic to delegate all of these tasks to an algorithm. At least for now, the verifications and the responsibility for them should be carried out by professionals (Ottavio, 2018, Manente, 2016, p. 211). The same considerations should also apply to the authentication of artworks, which should be entrusted to auction houses and research institutions. Therefore, the most credible solution considers it useful to structure a private or hybrid blockchain, allowing only these categories of entities to access the blockchain and validate transactions. This activity could be undertaken by either the government, even though it would involve conditions not covered in this article[5], or by private entities. The preference for the latter option arises because it doesn't require mandatory regulatory intervention from the public administration.

Finally, it should be noted that the blockchain-based registration system can be employed not only in the art market but also in any other remote registration activity that requires a certification document. Therefore, it could also enhance democratic systems by enabling direct citizen participation in the institutional decision-making process through the use of distributed ledger technology, for example conducting elections (Atzori, 2015). Distributed ledger technology still does not prove sufficient to independently manage a secure registration system; however, it can serve as an efficient organizational component in the delivery of certain services.

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