

Legal Frameworks for Protecting Digital Art and NFTs: Navigating Copyright and Ownership Rights in Virtual Spaces

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Abstract

The rise of digital art and Non-Fungible Tokens (NFTs) has revolutionized the creative economy, offering new avenues for artists and collectors. However, this rapid growth has also introduced significant legal challenges, particularly regarding copyright and ownership rights. Digital art, which encompasses a wide range of creations such as digital paintings, animations, and 3D models, exists in a decentralized and virtual space, making it difficult to apply traditional legal frameworks. NFTs, which are unique digital assets that serve as a proof of ownership for a specific piece of digital content, have further complicated the legal landscape. While NFTs provide a mechanism for establishing ownership and provenance, they do not automatically transfer copyright or guarantee that the underlying artwork is protected under intellectual property laws. This article explores the current legal frameworks surrounding digital art and NFTs, analyzing the distinctions between ownership and copyright, the challenges of enforcing legal protections across borders, and the potential for technological solutions such as blockchain and smart contracts to address these issues. The article also examines recent case studies and legal precedents, offering insights into the evolving nature of digital art law. Finally, the article proposes legal reforms, international collaboration, and best practices for stakeholders in the NFT ecosystem, aiming to create a more secure and transparent environment for digital art creators, collectors, and marketplaces.

Keywords: Digital Art, NFTs, Copyright Law, Blockchain, Intellectual Property, Smart Contracts

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1. Introduction

The digital art landscape has evolved significantly in recent years, driven in part by the rapid rise of Non-Fungible Tokens (NFTs). These digital assets, which are built on blockchain technology, have brought forth a new way of buying, selling, and owning digital creations. Digital art encompasses a wide range of works, from traditional digital paintings to 3D models and virtual sculptures, all of which can now be uniquely identified and traded as NFTs (Madine et al., 2023). NFTs provide a mechanism for asserting ownership of a unique piece of digital content, a crucial feature in an era where digital duplication and distribution are prevalent. These tokens are not interchangeable, unlike cryptocurrencies, making each NFT a unique item with its own value, based on its underlying content and market demand (Ali et al., 2023; Alnafrah & Bogdanova, 2019; Disemadi, 2022; Nadini et al., 2021). The advent of NFTs has enabled artists to monetize their work in new ways, allowing for direct interaction with buyers and collectors without intermediaries. The significance of NFTs extends beyond art into various sectors, including gaming, virtual real estate, and even intellectual property rights, further underscoring their impact on virtual economies and digital spaces.

As NFTs become increasingly popular, the question of legal protection for digital art becomes more pressing. Traditional intellectual property frameworks were not designed with the complexities of digital and blockchain-based assets in mind, leading to significant challenges in ensuring the protection of digital art and the rights of creators. In the absence of clear regulations, issues related to copyright infringement, ownership disputes, and the risks associated with the loss or theft of NFTs have emerged (Jiménez & Jiménez, 2023; K., 2023; Lee et al., 2023; Lemley, 2016; Lim, 2023; Madine et al., 2023; Nogueira et al., 2023). Copyright laws, for instance, generally grant creators exclusive rights to their works, including the right to reproduce, distribute, and display them. However, when digital art is tokenized as an NFT, it becomes unclear whether the purchase of an NFT automatically transfers the copyright to the buyer or if the artist retains the copyright while only selling the ownership of the token itself. This distinction has led to confusion among artists, buyers, and legal professionals alike (Bamakan et al., 2021, 2022; Brisov & Pobedkin, 2022; Jia, 2023). Furthermore, the decentralized nature of blockchain technology, which underpins NFTs, presents its own set of challenges for enforcing legal rights, as ownership and transactions occur in a space that is not controlled by any single jurisdiction or entity.

The importance of establishing robust legal frameworks for digital art and NFTs cannot be overstated. As digital art continues to gain traction as a legitimate form of creative expression and investment, legal protections are needed to preserve the rights of artists and buyers while preventing exploitation or fraudulent activity. Copyright laws need to evolve to reflect the unique characteristics of digital and tokenized art. The current systems are often ill-equipped to handle the complexities introduced by NFTs, such as the difficulty in tracking ownership across decentralized platforms and the potential for unauthorized reproductions of digital works (Ali et al., 2023; Alnafrah & Bogdanova, 2019; Disemadi, 2022; Nadini et al., 2021). Moreover, without clear legal protections, artists may be deterred from fully embracing the NFT space, as they may fear losing control over their creations or failing to receive fair compensation. For buyers, the lack of legal clarity could result in disputes over ownership or a lack of recourse in the event of fraud or theft. Thus, the implementation of appropriate legal frameworks is crucial to ensuring the continued growth and sustainability of the digital art market and to safeguarding the interests of all stakeholders involved.

This article aims to explore the current legal frameworks that govern the protection of digital art and NFTs. It will examine the existing intellectual property laws and their applicability to NFTs, as well as the challenges posed by blockchain technology's decentralized nature.

2. Conceptual Background

Digital art represents a broad and dynamic category of creative work that is produced and experienced primarily in digital form. It encompasses a variety of mediums, ranging from digital paintings and illustrations to animations, 3D models, virtual sculptures, and even interactive virtual installations. Digital art allows for the creation of pieces that would be difficult, if not impossible, to replicate in the physical world, such as interactive environments or art pieces that change over time. In recent years, the growing accessibility of digital tools and platforms for both creation and distribution has democratized the art world, enabling a new generation of artists to explore creative possibilities that extend far beyond traditional artistic media (Ali et al., 2023; Alnafrah & Bogdanova, 2019; Disemadi, 2022; Nadini et al., 2021). Digital art can exist as a standalone creation or as part of a larger project, often merging with other forms of digital content such as video, sound, and even augmented or virtual reality. Furthermore, it exists within a fluid, constantly evolving digital ecosystem, often sharing space with other forms of media like social media content or gaming elements.

In the context of digital art, NFTs (Non-Fungible Tokens) have introduced a new paradigm for ownership and authenticity. Unlike cryptocurrencies such as Bitcoin or Ethereum, which are fungible and interchangeable with one another, NFTs are unique, one-of-a-kind digital assets that represent ownership of a specific item. These tokens are built on blockchain technology, which allows for a transparent and immutable record of ownership and transaction history. Each NFT contains metadata that links it to a digital object, such as a digital artwork, and this metadata is stored on a decentralized blockchain, typically Ethereum. The blockchain serves as a secure, distributed ledger that records the history of the NFT, including details of its creation, purchase, and subsequent transfers. This chain of provenance ensures that the NFT is verifiably authentic and provides a mechanism for artists to retain control over the transfer and sale of their work (Ali et al., 2023; Alnafrah &

Bogdanova, 2019; Disemadi, 2022; Nadini et al., 2021). The relationship between NFTs and blockchain is crucial in establishing the legitimacy and value of digital art in the virtual space. Blockchain technology ensures that each NFT has a unique, traceable identity, which can be tied back to the original creator or artist. This opens up new avenues for the monetization and distribution of digital art, allowing artists to sell directly to collectors and avoid traditional intermediaries, such as galleries or auction houses, who have historically played a role in determining the value and authenticity of artworks.

One of the key features of NFTs is the ability to embed smart contracts within the token itself. These self-executing contracts can automatically trigger specific actions, such as royalty payments, whenever the NFT is sold or transferred. This functionality offers significant benefits to artists, enabling them to receive compensation for future sales or resales of their work. This feature is particularly important in the digital art space, where works can be easily copied and shared without the artist's consent. By embedding royalty clauses into the smart contract, artists can ensure that they receive a percentage of the sale price whenever their work changes hands, thus maintaining a form of economic control over their creations even after the initial sale (Jiménez & Jiménez, 2023; K., 2023; Lee et al., 2023; Lemley, 2016; Lim, 2023; Madine et al., 2023; Nogueira et al., 2023). While NFTs provide a mechanism for asserting ownership of digital art, they also raise important questions regarding the rights and responsibilities of the buyer and the seller, particularly when it comes to copyright and intellectual property ownership.

The rise of NFTs has illuminated many challenges related to copyright and ownership in the digital age, particularly concerning the distinction between owning an NFT and owning the underlying intellectual property (IP) rights of the digital work. The purchase of an NFT often confers ownership of the token itself, but not necessarily the copyright to the artwork it represents. The buyer may own the token, which proves their possession of the specific digital file, but they do not automatically acquire the right to reproduce, modify, or distribute the artwork. These rights typically remain with the creator of the digital work unless explicitly transferred. This creates a complex landscape where buyers may believe they own more rights to the artwork than they actually do, which can lead to disputes regarding copyright infringement and the permissible use of the digital art (Ali et al., 2023; Alnafrah & Bogdanova, 2019; Disemadi, 2022; Nadini et al., 2021).

In the digital environment, the protection of intellectual property is more challenging than in the physical world due to the ease with which digital works can be copied and distributed. This is particularly evident in the case of digital art, where a simple screenshot or file download can replicate a work with no loss of quality. Unlike physical art, where ownership is typically associated with the possession of the physical object, digital art can be infinitely replicated without diminishing its value, leading to concerns about unauthorized distribution and reproduction. Copyright laws were designed to address these concerns, but they often fall short in the context of the digital world, where traditional notions of ownership and reproduction are complicated by the nature of the internet and digital technologies. For example, while an artist may hold the copyright to their work, enforcement of that copyright is difficult, particularly when digital content can be easily shared across multiple platforms without the artist's knowledge or consent (Jiménez & Jiménez, 2023; K., 2023; Lee et al., 2023; Lemley, 2016; Lim, 2023; Madine et al., 2023; Nogueira et al., 2023).

Moreover, the global nature of the internet complicates the enforcement of copyright protections. Traditional copyright laws are typically tied to specific jurisdictions, meaning that an artist's rights may only be enforceable within the borders of their own country. However, the internet operates across borders, and digital art can be shared or distributed globally in a matter of seconds, often making it difficult for creators to track and control where their work is being used or repurposed. This discrepancy between national and international copyright laws has created a legal gray area where artists are often left to navigate complex, inconsistent, or outdated regulations in order to protect their work. In response, some have argued that there is a need for more comprehensive international frameworks to address digital copyright issues and to offer creators better protection in the digital age (Bamakan et al., 2022).

NFTs have been heralded as a potential solution to some of these issues, particularly when it comes to establishing and maintaining ownership and provenance of digital works. The blockchain, by nature, provides a decentralized and transparent ledger that records all transactions associated with an NFT, including its initial creation and subsequent transfers. This chain of ownership can serve as a digital certificate of authenticity, providing a way for artists to verify the originality of their work and for buyers to ensure they are acquiring a legitimate piece (Bamakan et al., 2021, 2022; Brisov & Pobedkin, 2022; Jia, 2023). In theory, this system could reduce the risk of fraud and unauthorized duplication, but it does not address the fundamental

issue of copyright. Even though an NFT can prove ownership of the token, it does not necessarily confer ownership of the underlying intellectual property rights, unless those rights are explicitly transferred in the terms of the sale (Ali et al., 2023; Alnafrah & Bogdanova, 2019; Disemadi, 2022; Nadini et al., 2021). Thus, while NFTs can help artists establish ownership of a digital file, they do not inherently resolve the complexities of copyright law, especially when it comes to the reproduction and commercial use of digital art.

Another challenge in the digital environment is the potential for the loss or destruction of digital works and NFTs. NFTs rely on blockchain technology, which is generally considered secure and immutable. However, the digital art associated with NFTs is often stored off-chain, meaning it exists outside of the blockchain itself and is typically hosted on centralized servers or decentralized storage networks. If these platforms were to experience technical failures, data breaches, or other forms of loss, the digital art could be permanently lost, along with the corresponding NFT. This highlights the need for improved systems of storage and backup in order to safeguard the digital assets linked to NFTs and to ensure the longevity of digital art (Jiménez & Jiménez, 2023; K., 2023; Lee et al., 2023; Lemley, 2016; Lim, 2023; Madine et al., 2023; Nogueira et al., 2023).

Ultimately, the protection of digital art in the age of NFTs presents both opportunities and challenges. While blockchain technology and NFTs offer new methods for establishing ownership, tracking provenance, and ensuring fair compensation for artists, they also highlight the gaps and limitations of traditional copyright frameworks. As digital art continues to grow in prominence, there will be increasing pressure to adapt existing legal frameworks and create new models that address the complexities of copyright, ownership, and enforcement in a rapidly evolving digital landscape. The development of these frameworks will be essential for ensuring that creators are adequately protected and that the rights of digital artists are respected in virtual spaces.

3. Current Legal Frameworks for Digital Art

The legal protection of digital art in the context of NFTs is a complex issue that intertwines international copyright laws, national legal approaches, and traditional intellectual property frameworks. These existing legal structures were not originally designed to address the unique challenges presented by digital technologies, especially in the era of NFTs and blockchain. As the digital art market grows, understanding how international and national laws intersect with these new technologies is essential to ensuring that creators' rights are protected, and ownership disputes are mitigated.

Internationally, copyright laws have long been the cornerstone of intellectual property protection for creative works, including digital art. One of the key frameworks in international copyright law is the Berne Convention for the Protection of Literary and Artistic Works, which sets minimum standards for the protection of authors' rights across its signatory countries. The Convention grants authors exclusive rights over their works, including the right to reproduce, distribute, perform, and display them, as well as to make derivative works (Ali et al., 2023; Alnafrah & Bogdanova, 2019; Disemadi, 2022; Nadini et al., 2021). While the Berne Convention does not directly address digital art or NFTs, its provisions are generally interpreted to apply to digital works, meaning that any original digital artwork is eligible for copyright protection as long as it meets the requisite criteria of originality. However, the digital nature of these works poses challenges. For instance, digital art is easily reproducible, and the ease with which it can be copied and shared on the internet complicates enforcement of copyright protections (Ali et al., 2023; Alnafrah & Bogdanova, 2019; Disemadi, 2022; Nadini et al., 2021). Additionally, the anonymity and decentralized nature of blockchain technology, which underpins NFTs, raises questions about jurisdiction and enforcement in the context of international copyright law. This issue is particularly pertinent in the case of NFTs, where ownership of the token does not necessarily equate to ownership of the underlying artwork's copyright, potentially leading to confusion and disputes over rights (Jiménez & Jiménez, 2023; K., 2023; Lee et al., 2023; Lemley, 2016; Lim, 2023; Madine et al., 2023; Nogueira et al., 2023).

In addition to international agreements like the Berne Convention, national legal frameworks also play a significant role in the protection of digital art and NFTs. Different countries have developed their own approaches to adapting intellectual property laws to the digital age. In the United States, the Copyright Act of 1976 was amended to address the digital realm, including provisions that extend copyright protection to digital works such as computer programs, websites, and digital art. However, the U.S. approach to NFTs and digital art is still evolving, and there is no specific legal framework for NFTs yet. Courts have

addressed some of the challenges through case law, particularly regarding issues of copyright infringement and the sale of digital works as NFTs. For example, the U.S. Copyright Office has clarified that copyright law applies to digital art and can be enforced even in the context of NFTs. However, the legal relationship between the ownership of the NFT and the underlying copyright remains unclear, creating ambiguity around what rights a buyer of an NFT actually acquires (Ali et al., 2023; Alnafrah & Bogdanova, 2019; Disemadi, 2022; Nadini et al., 2021). Similarly, European Union law offers copyright protection for digital art through the EU Copyright Directive, which is harmonized across member states. While the EU provides a more uniform approach to copyright, challenges persist in reconciling EU law with the decentralized and borderless nature of NFTs (Ali et al., 2023; Alnafrah & Bogdanova, 2019; Disemadi, 2022; Nadini et al., 2021).

Beyond these broader international and national frameworks, traditional intellectual property laws, such as copyright, trademark, and patent laws, have varying degrees of relevance in the context of digital art and NFTs. Copyright law has always been the primary method for protecting artistic works, and its relevance in the digital age remains substantial, particularly when it comes to the ownership and reproduction of digital art (Jiménez & Jiménez, 2023; K., 2023; Lee et al., 2023; Lemley, 2016; Lim, 2023; Madine et al., 2023; Nogueira et al., 2023). However, NFTs present a unique challenge in this context, as they may not automatically transfer the copyright to the buyer. For example, when an artist creates a piece of digital art and sells it as an NFT, the buyer acquires the token, but the copyright to the underlying artwork often remains with the creator unless explicitly transferred. This distinction is critical because it affects how the artwork can be reproduced or used commercially, and it may lead to conflicts if the buyer believes they own the copyright simply because they own the NFT (Ali et al., 2023; Alnafrah & Bogdanova, 2019; Disemadi, 2022; Nadini et al., 2021). As a result, legal clarity is needed to define the scope of rights associated with NFT ownership, particularly regarding derivative works or the use of the artwork for commercial purposes.

Trademark law is another traditional IP framework that can intersect with the world of NFTs, particularly where digital art is branded or associated with certain creators, brands, or digital environments. Trademarks are used to distinguish the source of goods or services, and they can be applied to the branding of digital artworks or NFT marketplaces. For instance, a well-known artist or company may use a trademark to protect their brand identity in the digital space. However, issues may arise when NFTs are created or sold that infringe on established trademarks, such as when counterfeit versions of a well-known brand's artwork are tokenized and sold without permission. In such cases, trademark law could provide a tool for trademark holders to prevent unauthorized sales or distribution of NFTs bearing their brand (Ali et al., 2023; Alnafrah & Bogdanova, 2019; Disemadi, 2022; Nadini et al., 2021). While trademark law offers some level of protection, it is also limited by the scope of the digital marketplace and the global nature of NFT transactions, which may complicate enforcement across borders.

Patent law, though less frequently invoked in the context of digital art and NFTs, could also play a role, particularly in relation to the technology underlying NFTs and blockchain networks. For example, certain innovations related to the use of blockchain in the creation, sale, or transfer of NFTs may be eligible for patent protection. Blockchain technology itself, as the foundation of NFTs, has the potential for patentable inventions related to encryption methods, transaction protocols, or the processes used in minting and transferring NFTs. However, patent protection for such technological developments in the blockchain space is still a relatively new and evolving area of law (Bamakan et al., 2021, 2022; Brisov & Pobedkin, 2022; Jia, 2023). Given that NFTs rely on blockchain infrastructure, issues related to the patentability of blockchain innovations could become increasingly relevant as the market for digital art and NFTs expands. In contrast to copyright and trademark law, which protect the creative and branding aspects of NFTs, patent law would address the technological elements that enable NFTs to exist and function.

Despite these traditional intellectual property laws, one of the key issues facing the protection of digital art and NFTs is the need for more tailored legal frameworks. Existing laws often fall short of addressing the specific challenges posed by digital and blockchain-based assets. For example, while copyright law grants authors rights to their creative works, it is less clear how these rights translate when the artwork is tokenized as an NFT and sold on a blockchain. The decentralized nature of blockchain complicates enforcement, and the anonymity of NFT transactions further obscures the identification of parties involved in potential legal disputes. This situation is compounded by the lack of international consensus on how to regulate NFTs, with different countries adopting varying approaches to tax, intellectual property, and consumer protection laws (Ali et al., 2023;

[Alnafrah & Bogdanova, 2019](#); [Disemadi, 2022](#); [Nadini et al., 2021](#)). Furthermore, the relatively new and rapidly evolving nature of NFTs and blockchain technology means that legal precedents are still being established, and many of the current legal frameworks may not yet be sufficient to address the complexities of the digital art market.

The current legal landscape for protecting digital art and NFTs remains fragmented and nascent, as existing international and national legal frameworks struggle to keep pace with the rapid growth and technological innovations of the NFT space. While copyright law provides some level of protection for digital works, the distinction between ownership of the NFT and the underlying intellectual property rights of the artwork needs clearer definition. Similarly, the application of trademark and patent law to NFTs presents new challenges, particularly with regard to the protection of digital brands and technological innovations. As the market for NFTs continues to expand, it will be essential for legal frameworks to evolve and adapt to these new realities, ensuring that creators, buyers, and sellers are adequately protected in the increasingly complex world of digital art and NFTs.

4. NFTs and Copyright Issues

The distinction between ownership of an NFT and the copyright of the underlying artwork has become a central issue in the digital art space. When an NFT is purchased, the buyer acquires ownership of the token, which is a unique digital asset tied to a specific piece of art. However, this ownership does not necessarily include the copyright to the artwork itself. Copyright refers to the legal rights granted to the creator of an original work, allowing them to control how that work is used, reproduced, and distributed. These rights are typically separate from the ownership of a physical or digital object associated with the artwork. In the case of NFTs, this distinction becomes crucial because the transaction of an NFT typically only transfers ownership of the token, not the copyright of the digital artwork represented by the token ([Ali et al., 2023](#); [Alnafrah & Bogdanova, 2019](#); [Disemadi, 2022](#); [Nadini et al., 2021](#)). The buyer may own the NFT and have the right to resell it, but they do not automatically have the right to reproduce or create derivative works based on the underlying digital art unless those rights have been explicitly transferred by the creator.

This issue is further complicated by the decentralized and pseudonymous nature of blockchain technology. While the blockchain records transactions related to NFTs, it does not automatically include a formal legal structure for the transfer of copyright. The metadata associated with an NFT may include references to the artwork and its creator, but it does not provide a detailed legal agreement regarding the copyright terms ([Bamakan et al., 2021, 2022](#); [O'Dwyer, 2018](#); [Osunde, 2017](#)). This lack of clarity has led to confusion and disputes between artists, buyers, and collectors, especially when an NFT representing a digital artwork is resold without the artist's permission or when the artwork is used in ways that violate copyright laws. In many cases, artists retain the copyright to their works even after the NFT is sold, but enforcing these rights becomes difficult due to the decentralized nature of NFT transactions and the ease with which digital art can be copied and redistributed online.

Smart contracts, which are self-executing contracts with the terms of the agreement directly written into lines of code, are a key feature of NFTs. These contracts are typically deployed on blockchain platforms and automate various aspects of NFT transactions, including transferring ownership, setting up royalties, and executing sales. Smart contracts can potentially play a significant role in enforcing copyright terms, as they allow creators to specify conditions under which their work can be used or resold ([Ali et al., 2023](#); [Alnafrah & Bogdanova, 2019](#); [Disemadi, 2022](#); [Nadini et al., 2021](#)). For example, an artist might include a clause in a smart contract that ensures they receive a percentage of any resale proceeds through a royalty mechanism, often referred to as a "resale royalty." This is one of the features that sets NFTs apart from traditional art sales, where artists typically do not receive royalties from secondary sales of their work. By embedding these terms into the smart contract, artists can ensure that they are compensated for the ongoing value of their work, even after it changes hands.

However, while smart contracts offer new opportunities for enforcement, they also introduce several complications. One of the key challenges is that the terms embedded in a smart contract are only as effective as the blockchain and the marketplace platforms that support them. If a smart contract is poorly coded or if the marketplace does not enforce the agreed terms, the enforcement of copyright and other legal protections may be ineffective ([Bamakan et al., 2021, 2022](#); [Brisov & Pobedkin, 2022](#); [Jia, 2023](#)). Furthermore, the self-executing nature of smart contracts means that once they are deployed, they are difficult to amend. This creates potential issues if the terms of the contract become outdated or if there is a need to update the copyright terms due to changes in the law or new agreements with the buyer ([Ali et al., 2023](#); [Alnafrah & Bogdanova, 2019](#); [Disemadi,](#)

2022; Nadini et al., 2021). Additionally, the decentralized nature of blockchain means that smart contracts cannot easily be altered or undone, which could lead to situations where artists or creators are unable to amend the terms to better reflect their rights or intentions over time.

Enforcing copyright in the digital art world has always been a difficult task, and NFTs have not fully solved these challenges. One of the most significant difficulties artists face in protecting their work online is the ease with which digital art can be copied, downloaded, and shared without permission. Unlike physical artworks, digital works do not require any physical interaction to be replicated; a simple screenshot or file copy can result in the illegal reproduction of a digital piece. Platforms that host digital art or NFTs, such as online galleries or NFT marketplaces, often have limited ability or incentive to police copyright infringement. While many platforms provide mechanisms for creators to report unauthorized use of their work, these systems are often reactive rather than proactive, leaving artists with the burden of enforcement (Bamakan et al., 2021, 2022; O'Dwyer, 2018; Osunde, 2017). Additionally, the sheer volume of content on digital platforms can make it difficult for copyright holders to track and address violations effectively.

NFTs were originally seen as a potential solution to some of these issues, as they provide a verifiable record of ownership and transaction history on the blockchain, which can help to establish provenance and authenticity. However, NFTs do not necessarily solve the underlying problem of copyright infringement. While an NFT may prove that someone owns the token representing a piece of digital art, it does not automatically prevent others from copying or distributing the artwork without authorization. This is especially problematic when the NFT is resold on a secondary market, as the artwork may be displayed or used without the creator's consent, even if the artist has retained the copyright (Bamakan et al., 2022). In some cases, digital platforms may host the artwork associated with an NFT on centralized servers, meaning that the artwork could still be accessed or downloaded without the creator's permission, even if the NFT itself is securely recorded on the blockchain (Bamakan et al., 2021, 2022; O'Dwyer, 2018; Osunde, 2017). This situation illustrates the limitations of NFTs in providing full protection against copyright violations, as the tokenization of art does not inherently address the issue of unauthorized use of the artwork itself.

The role of NFTs in the broader landscape of copyright enforcement is still evolving, and there is significant debate over whether they can offer real solutions to the problems faced by digital artists. On one hand, NFTs create a transparent and verifiable way to track ownership and transactions, which can help to combat issues like art forgery and theft. On the other hand, NFTs do not provide a complete solution to the problem of copyright infringement, as they do not inherently prevent the illegal reproduction or use of the underlying artwork. As the market for NFTs and digital art continues to grow, it will be important for legal frameworks and technological tools to evolve in tandem to address these challenges effectively. The integration of NFTs with traditional copyright systems, including clearer licensing agreements and stronger enforcement mechanisms, will be crucial in ensuring that creators can protect their intellectual property in the digital age (Jayaraman, 2020; Jiménez & Jiménez, 2023; Lim, 2023).

5. Legal Gaps and Challenges

The legal landscape surrounding NFTs and digital art is marked by significant gaps and challenges that complicate the enforcement of intellectual property rights, especially when it comes to the decentralized nature of the internet and blockchain technology. One of the primary jurisdictional issues arises from the global reach of NFTs. Since NFTs and their transactions occur on blockchain networks that are inherently decentralized, they are not confined to the legal boundaries of any particular country or region. This creates complications for enforcing legal protections across borders. Unlike traditional physical artworks, which are subject to the laws of the country in which they are created or sold, digital assets such as NFTs exist on a global scale, meaning that a transaction involving an NFT can involve parties from multiple jurisdictions. For example, an artist in one country may sell an NFT of their artwork to a buyer in another country, yet the enforcement of copyright or ownership rights would depend on the ability to navigate both legal systems. Additionally, many countries have different legal frameworks for copyright protection, and some may not even recognize the notion of digital ownership in the same way. This divergence in legal approaches creates confusion and inconsistency, particularly when issues such as copyright infringement or intellectual property theft occur (Jayaraman, 2020; Jiménez & Jiménez, 2023; Lim, 2023).

Moreover, the decentralized nature of blockchain itself further complicates the application of jurisdictional law. Blockchains are distributed ledgers, meaning they are maintained across multiple nodes globally, with no central authority overseeing the transactions. As a result, even if a particular jurisdiction has laws that apply to digital art and NFTs, enforcing those laws is more difficult when the blockchain operates outside the control of any single government. This problem is exacerbated by the pseudonymity of blockchain users, who can remain anonymous or use digital identities that make it difficult to trace legal violations back to specific individuals. Such anonymity adds another layer of complexity for legal authorities seeking to address issues of copyright infringement or fraud in the NFT space. As NFTs continue to gain popularity and attract more artists, buyers, and collectors, the lack of a clear legal framework for enforcing rights across borders will likely remain a major challenge (Bamakan et al., 2021, 2022; O'Dwyer, 2018; Osunde, 2017).

Another major issue is the absence of standardized regulations for NFT transactions, copyright, and ownership rights. While NFTs are a relatively new technology, and global regulatory bodies have yet to reach consensus on how to govern them, the lack of uniformity in laws and regulations poses challenges for both creators and consumers. There is currently no overarching global standard for how NFTs should be classified legally, which creates significant uncertainty for artists, collectors, and legal professionals alike. Different countries have adopted varying approaches to regulate digital assets, and this divergence can lead to confusion regarding the legal status of NFTs and the rights associated with them. For instance, while some jurisdictions treat NFTs as property under certain legal frameworks, others may regard them as securities or digital commodities. These discrepancies create confusion for artists trying to protect their work and for buyers seeking to understand what rights they have upon purchasing an NFT (Jayaraman, 2020; Jiménez & Jiménez, 2023; Lim, 2023).

Without a standardized global approach, NFT transactions can often involve different interpretations of copyright law and ownership, making it difficult to establish clear guidelines for all parties involved. Furthermore, in the absence of consistent regulation, NFT platforms and marketplaces may develop their own rules, leading to a patchwork of regulations that may not adequately protect artists' rights or address the complexities of ownership in digital art. This lack of uniformity not only undermines the protection of intellectual property but also contributes to the overall instability of the NFT market, deterring some potential buyers and creators from fully engaging with the space (Bamakan et al., 2021, 2022; Brisov & Pobedkin, 2022; Jia, 2023).

The challenge of establishing digital provenance and authenticity is another critical issue in the NFT space. Provenance, or the history of ownership, is a key factor in determining the value of a piece of art, and this is particularly true for digital art. NFTs aim to solve the issue of provenance by linking a unique digital token to an artwork, thereby providing a verifiable chain of ownership. However, while the blockchain can confirm the ownership of the NFT itself, it does not inherently confirm the authenticity of the underlying artwork. This means that even if an NFT is sold as a token of ownership for a specific digital artwork, there is no guarantee that the artwork is authentic or that the seller has the legal right to sell it. The blockchain may show a clear history of transactions for an NFT, but it cannot verify whether the digital art was copied or altered from another creator's work (Jayaraman, 2020; Jiménez & Jiménez, 2023; Lim, 2023).

In addition, digital artworks are easy to duplicate and distribute across various online platforms, which raises concerns about the provenance of digital art and the potential for fraud. This has led to instances where unauthorized copies of artwork are minted as NFTs, with the false implication that the buyer is acquiring a unique and original piece. Without adequate systems for verifying the authenticity of the artwork itself, buyers may unknowingly purchase counterfeit NFTs or works that are not legally owned by the seller. Furthermore, artists face significant difficulties in tracking the use and distribution of their works once they are digitized and tokenized, particularly if these works are distributed or used without their consent in various NFT marketplaces (Bamakan et al., 2021, 2022; O'Dwyer, 2018; Osunde, 2017). This problem is compounded by the fact that blockchain, while providing transparency about ownership of tokens, does not provide a mechanism to verify the creator's rights to the artwork, leading to situations where counterfeit works can be sold without the original artist's involvement.

Scalability and intellectual property theft are also significant concerns in the digital art and NFT space. The ease with which digital artworks can be copied and distributed on the internet has long been a problem for artists seeking to protect their intellectual property. NFTs do not eliminate the risk of unauthorized copying or distribution; they simply provide a mechanism for verifying ownership of the token associated with the artwork. Artists continue to face significant challenges when it comes to enforcing their copyright and preventing the unauthorized use or reproduction of their works. In some cases, digital art may

be sold as an NFT without the artist's knowledge, or a digital artwork might be reproduced and tokenized by someone else without permission, leading to a proliferation of counterfeit NFTs that dilute the value of original works (Bamakan et al., 2022).

Moreover, the scalability of the NFT market poses challenges in terms of monitoring and regulating intellectual property theft. As the market for NFTs grows, it becomes increasingly difficult to track all transactions and ensure that artists' rights are respected. The decentralized and pseudonymous nature of the blockchain makes it difficult to monitor the use of digital art across platforms, and many marketplaces do not have robust mechanisms in place to detect or prevent the sale of infringing works. This leaves artists vulnerable to exploitation and reduces their ability to control how their works are used in the digital space. While some platforms have introduced tools to help verify the authenticity of NFTs and prevent copyright infringement, these measures are not always effective, and the sheer volume of NFTs being minted daily makes it increasingly difficult to address these issues on a large scale (Bamakan et al., 2021, 2022; O'Dwyer, 2018; Osunde, 2017).

In conclusion, the legal gaps and challenges surrounding NFTs and digital art are multifaceted and require a coordinated global effort to address. Jurisdictional issues, the lack of standardized regulations, challenges related to digital provenance, and intellectual property theft all contribute to the complexity of protecting creators' rights in the digital art space. As NFTs continue to reshape the art market, it is crucial that legal frameworks evolve to keep pace with these changes, ensuring that artists are adequately protected and that buyers can trust the authenticity and ownership of the digital works they acquire. Without such protections in place, the full potential of NFTs as a mechanism for empowering artists and fostering creativity in the digital space may remain unrealized.

6. Future Directions and Recommendations

As the NFT and digital art market continues to grow, it becomes increasingly evident that existing legal frameworks need to adapt to the unique challenges posed by this rapidly evolving field. One key area that demands attention is the potential reform of international copyright laws to better address the nuances of digital art and NFTs. Currently, many copyright frameworks, such as those governed by international agreements like the Berne Convention, are not fully equipped to handle the specific issues related to digital assets and blockchain technology. For instance, the Berne Convention grants copyright protection to authors of original works, but it does not account for the complexities of decentralized digital spaces, where ownership and rights can be fragmented or obscured (Jayaraman, 2020; Jiménez & Jiménez, 2023; Lim, 2023). This gap suggests the need for targeted legal reforms that would provide clearer guidelines on the relationship between NFTs, digital art, and copyright protection. These reforms could include establishing new provisions for digital works, recognizing blockchain-based ownership and provenance as legally binding, and clarifying the distinction between ownership of an NFT and the copyright of the underlying artwork. Such legal reforms would help ensure that creators are adequately protected and that NFT transactions are more transparent and legally enforceable.

In addition to legal reforms, technological solutions hold significant promise in addressing some of the issues surrounding the enforcement of copyright and ownership verification in the NFT space. Blockchain technology, which underpins NFTs, is inherently transparent and immutable, making it an ideal tool for recording ownership and provenance of digital art. However, the challenge remains in ensuring that the rights to the underlying artwork are clearly defined and protected on the blockchain. One potential solution could involve integrating more sophisticated smart contracts that automatically enforce the terms of copyright agreements. These smart contracts could include clauses that ensure the creator retains certain rights over the digital artwork, such as the right to receive royalties from secondary sales or the right to approve the use of the work in derivative forms. By embedding these terms directly into the contract, blockchain could provide a more automated and enforceable mechanism for ensuring that artists are compensated fairly and that their rights are respected (Jayaraman, 2020; Jiménez & Jiménez, 2023; Lim, 2023). Furthermore, the use of blockchain for provenance verification could also mitigate concerns about fraud and the unauthorized sale of digital artworks. By providing a transparent, verifiable record of a work's creation, ownership, and transactions, blockchain can serve as a more reliable mechanism for verifying the authenticity of digital art and NFTs.

While technological solutions like blockchain and smart contracts offer promising tools for improving copyright enforcement, they cannot fully resolve the complex legal and jurisdictional challenges associated with NFTs and digital art. These challenges underscore the importance of international collaboration in developing unified legal frameworks that can be applied consistently across borders. The decentralized nature of blockchain, along with the global reach of NFTs, means that legal issues often span multiple jurisdictions, each with its own laws and regulations. As a result, a coordinated approach is essential to ensure that digital art creators and collectors have consistent protection and rights, regardless of where they are located. International bodies, such as the World Intellectual Property Organization (WIPO), could play a key role in fostering cross-border collaboration and developing standards for the protection of digital art in the NFT space. These standards could include clear definitions of ownership, copyright, and intellectual property rights in the context of blockchain-based assets. Furthermore, international treaties could help to harmonize the application of intellectual property laws across different regions, creating a more predictable and consistent legal environment for the NFT market (Jayaraman, 2020; Jiménez & Jiménez, 2023; Lim, 2023).

In the absence of comprehensive global regulations, it is also important for artists, collectors, and NFT platforms to adopt best practices that can help navigate the legal landscape effectively. Artists should be proactive in clearly defining the terms of their work's sale, including whether the sale of an NFT includes the transfer of copyright or is limited to ownership of the token itself. This could be done through the use of contracts and licensing agreements that are included in the metadata of the NFT or in separate documents that accompany the sale. Additionally, artists should consider implementing smart contracts that automatically enforce certain rights, such as royalty payments for secondary sales, to ensure that they continue to benefit from the appreciation of their work over time (Jayaraman, 2020; Jiménez & Jiménez, 2023; Lim, 2023). For collectors, understanding the legal distinction between owning an NFT and owning the copyright to the underlying artwork is crucial. Buyers should always be aware of the rights they are acquiring with the purchase of an NFT, including whether they have permission to display, reproduce, or sell the artwork in the future. To mitigate risks, collectors should also verify the provenance of the artwork and the NFT to ensure that the artist holds the necessary rights to the work and that the sale is legitimate.

NFT platforms also have an important role to play in creating a fair and transparent market. These platforms should implement robust mechanisms for verifying the ownership and copyright of digital art before allowing NFTs to be sold. This could involve working with artists to verify their identity and their rights to the work being tokenized or establishing partnerships with copyright organizations to ensure that the artwork is protected under existing intellectual property laws. Platforms should also consider providing clear guidelines for buyers and sellers, helping to clarify the distinction between ownership of the NFT and ownership of the underlying copyright. By promoting transparency and trust in the NFT marketplace, these platforms can help ensure that artists are compensated fairly and that buyers have confidence in the authenticity of the works they purchase (Jayaraman, 2020; Jiménez & Jiménez, 2023; Lim, 2023).

The growing market for digital art and NFTs presents significant opportunities for creators, collectors, and platforms, but it also brings with it substantial legal and ethical challenges. The future of digital art in the NFT space will depend largely on the development of legal frameworks that are able to keep pace with technological innovation while protecting the rights of all stakeholders. Legal reforms, technological solutions such as blockchain and smart contracts, international collaboration, and best practices for artists, collectors, and platforms are all critical components of a robust legal ecosystem that can support the continued growth of the NFT market. As these elements evolve, it is likely that the legal landscape for NFTs will become more standardized and equitable, providing clearer guidelines and protections for digital artists and buyers alike. However, achieving this goal will require cooperation and ongoing dialogue between legal experts, technologists, artists, and policymakers to ensure that the rights of creators are respected and that the digital art market remains fair and transparent for all participants.

7. Conclusion

The rapid growth of digital art and NFTs has introduced both opportunities and challenges in the realm of intellectual property law. As digital artworks become increasingly valuable and NFTs gain prominence as a means of ownership and exchange, it is evident that existing legal frameworks are struggling to keep pace with these technological advancements. While digital art has opened up new avenues for creativity and expression, it has also highlighted the need for legal systems to evolve to address the unique characteristics of digital assets, particularly in terms of copyright and ownership.

One of the fundamental issues in this space is the distinction between ownership of an NFT and the copyright of the underlying digital artwork. Ownership of an NFT represents the transfer of a token, but it does not necessarily equate to ownership of the intellectual property rights associated with the artwork. This disconnection creates confusion for artists, collectors, and marketplaces alike, as the rights to reproduce, distribute, or create derivative works remain tied to the creator unless explicitly transferred. As the market for digital art and NFTs continues to expand, clearer guidelines and legal structures are needed to define and protect the rights of creators and buyers.

Technological solutions, particularly blockchain and smart contracts, offer potential mechanisms to enforce copyright terms and verify ownership. Smart contracts can automate certain aspects of copyright enforcement, such as ensuring royalties are paid to artists upon the resale of their works. However, these solutions are not without their challenges. While blockchain provides transparency, it does not inherently include a system for verifying the rights associated with a digital artwork, and this remains a significant hurdle for ensuring proper copyright enforcement.

Jurisdictional issues also complicate the legal landscape, as NFTs and digital art exist in a decentralized, global space that is not easily governed by national laws. The absence of standardized international regulation exacerbates the difficulty of enforcing rights across borders. In this context, international collaboration is essential to create unified legal frameworks that can address the unique challenges posed by NFTs and digital art, ensuring greater protection for creators and clarity for collectors.

The future of digital art and NFTs lies in the development of legal reforms, technological innovations, and global cooperation. As the industry matures, stakeholders from various sectors—artists, collectors, marketplaces, and legal professionals—must work together to establish best practices and ensure a fair and secure environment for all involved. By addressing the gaps in current legal frameworks and leveraging technology to enhance copyright protection, the digital art and NFT ecosystem can flourish in a way that respects the rights of creators while fostering innovation and growth.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

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Conflict of Interest

The authors report no conflict of interest.

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