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Article

Copyright Infringement and Damage Compensation Mechanisms in NFT and Digital Asset Transactions: A Legal Applicability Analysis Based on Blockchain Evidence

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Abstract: The rapid development of the NFT (Non-Fungible Token) market has significantly increased the complexity and difficulty of copyright protection within modern digital transactions. This study focuses comprehensively on the infringement and compensation mechanisms inherent in NFT transactions, critically analyzing the fundamental conflicts between blockchain-recorded "ownership" and traditional copyright frameworks. By systematically evaluating public judicial judgments and empirical on-chain transaction data from major NFT platforms such as OpenSea and LooksRare, this research reveals that purchasing an NFT merely confers ownership of a specific cryptographic token on the blockchain, which does not automatically transfer the underlying copyright of the associated digital work. This critical distinction frequently precipitates severe intellectual property infringement issues. In terms of damages compensation, the extreme volatility and large fluctuations in NFT market prices make it exceptionally difficult to determine actual financial losses accurately. Furthermore, digital works currently lack a unified, standardized reference for licensing fees, and establishing a direct causal relationship between the alleged infringement and subsequent economic losses remains highly problematic. Meanwhile, although immutable blockchain records possess strong evidentiary power in reliably restoring transaction paths and tracing fund flows, they remain inherently limited in definitively determining whether unauthorized reproduction or illicit use has occurred off-chain. To address these critical gaps, this paper proposes an innovative method for calculating equitable compensation by integrating dynamic market prices with verifiable blockchain transaction records, and thoroughly discusses the evolving recognition standards for blockchain-based evidence across different global judicial jurisdictions.

Keywords: non-fungible tokens; copyright infringement; damage compensation; blockchain evidence; digital assets

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1. Introduction

NFT confirms the ownership of the tokens on the blockchain, but not the copyright of the work itself [1]. Since the two are separate, during the process of minting, listing, and secondary trading of NFTs, copyright infringement issues are prone to arise repeatedly.

The copyright infringement in NFT transactions mainly falls into two categories [2]. One is when someone creates NFTs of works they do not own or do not have the right to use and then sells them. The other is when buyers mistakenly believe that by purchasing NFTs they can copy, disseminate, or adapt the works. These misunderstandings expose both the creators and the platforms to legal risks in different jurisdictions.

The legal nature of NFTs and their relationship with intellectual property rights remain controversial. The blockchain can record the creation and transfer process of tokens, and these records are difficult to tamper with. However, such records cannot directly reflect copyright infringement [3]. In actual cases, courts usually verify the timestamps, wallet addresses, and transaction records on the blockchain, determine whether these data are true, reliable, and relevant to the case, and then decide whether they can be used as evidence.

In such copyright disputes, it is very difficult to accurately estimate the compensation amount. The prices of digital assets fluctuate greatly, and there is no unified charging standard, making it hard to determine exactly how much was lost. The amount of money earned by the infringers can often be calculated based on market transaction data. However, these data may be anonymous and difficult to verify. At the same time, it is also challenging to prove that the infringement directly caused these economic losses, as the evidence collection process is quite difficult [3].

The role of blockchain evidence in litigation is manifested in that transactions can be traced, and it can also be used to illustrate the initial release of the work, the flow path of ownership, and provide certain clues of infringement. However, there is no unified standard for whether such evidence will be accepted by the court and what conditions it needs to meet [3]. Some courts require additional certification materials in addition to the records on the blockchain. This article focuses on the copyright infringement and damages compensation mechanism in NFT transactions, with a key analysis of the conflict between ownership and copyright, and further assessment of how blockchain evidence is used by the law in related disputes.

2. Literature Review

The intersection of NFT and copyright law has drawn significant attention in multiple jurisdictions. The legal risks in NFT transactions largely stem from the decentralized nature of blockchain platforms, which makes it difficult to determine the specific responsible party when unauthorized tokenization occurs. Additionally, most NFT platforms lack an effective copyright review mechanism before minting, and infringement identification often requires the copyright owners to do it themselves [4]. They have to continuously monitor the activities on the blockchain.

From a technical perspective, some scholars have proposed that copyright information can be directly incorporated into the smart contract of NFTs through semantic technology and metadata standards. It is suggested that if the licensing terms and rights information are made in a machine-readable format, a certain degree of automated copyright management can be achieved, allowing creators to set the usage scope when minting NFTs. However, the legal validity of this approach has not been tested by courts, especially when the content of the smart contract conflicts with the mandatory provisions of various countries' copyright laws, there remains uncertainty.

The protection of NFT digital collectibles requires finding a balance between the ownership records on the blockchain and traditional copyright rules. Through analyzing cases handled by Chinese courts regarding unauthorized creation of digital artworks, it has been pointed out that the current legal framework is unable to fully cover these new types of assets. Due to the lack of clear legislation, courts often compare NFTs to digital files or movable property when handling such cases, which also leads to inconsistent judgment results among different cases [5].

Blockchain data is gradually being accepted as evidence in China's copyright litigation [6]. It has been found that courts will adopt transaction hashes, timestamps, and smart contract codes as electronic evidence under certain conditions, provided that the process of preserving these data can prove their authenticity. Relevant judgments show that blockchain records can usually serve as preliminary evidence of transaction history, but their probative force still depends on the platform used and whether there are off-chain evidences to support it.

At the international level, some recent judicial precedents have begun to directly address intellectual property disputes related to NFTs. For instance, cases in the United States and Spain have provided references for trademark and copyright protection in the digital environment. Analysis of these cases indicates that when courts determine whether the creation and sale of NFTs constitute infringement, they will primarily consider their commercial purposes and whether they may cause confusion among consumers [7].

The distinction between NFT ownership and work copyright in terms of concept is the basis for analyzing infringement issues. It has been pointed out that tokenization actually creates a new asset. The transfer of NFT does not imply the transfer of reproduction rights or distribution rights, unless explicitly stipulated in smart contracts or other agreements. This distinction is legally valid, but it is often misunderstood in actual transactions [8].

In common law countries, when copyright infringement is difficult to prove, other infringement paths can be used to seek redress. Research has found that traditional infringement rules such as appropriation and unjust enrichment have been adjusted by courts and applied to disputes involving digital assets, including NFTs [6]. In some cases, even if copyright infringement does not hold, as long as it can be proven that the defendant interfered with the digital property rights of others, relief may still be obtained.

From a practical perspective, the art field is where NFT disputes are most concentrated. Research on cases from China, the United States, and the European Union has identified several common types, including unauthorized reproduction of copyrighted images, resale royalty disputes, and claims related to metadata fraud. It is pointed out that blockchain records have advantages in proving transaction times and aspects related to participation, but cannot reasonably prove the content of the works themselves.

China's judicial practice has provided important references for other regions that are establishing NFT copyright rules. Research shows that Chinese courts, when handling NFT disputes, mainly focus on infringement determination, the allocation of responsibilities between the platform and users, and the calculation of damages. Overall, it presents a more pragmatic orientation, strengthening copyright protection while also trying to avoid imposing excessive restrictions on technological development [9].

3. Theoretical Framework and Methodology

This chapter explains how this study analyzed the copyright infringement and damages issues in NFT transactions. The research employed a qualitative legal research method, primarily based on the analysis of public materials, without conducting questionnaire surveys or experiments. All data were sourced from existing public databases and judicial records [10].

3.1. Theoretical Framework

This study primarily examines the issue from three legal perspectives: intellectual property law, particularly the copyright rules related to digital works; the basic concepts of asset ownership in property law; and the requirements for electronic data and blockchain records in evidence law [4].

Copyright law provides the basic standards for determining whether NFT actions constitute infringement, such as the right of reproduction, the right of distribution, and the right of public display. These rights can be used to analyze the minting, listing, and transfer behaviors of NFTs. However, in the blockchain environment, many issues become less clear, such as whether copyright protection is subject to geographical restrictions and whether decentralized platforms need to assume responsibility.

The law of property rights helps explain the concept of NFT ownership. Traditionally, the law distinguishes between the ownership of a physical object and the ownership of its intellectual property rights. This distinction also applies to NFTs. That is to say, purchasing an NFT merely grants ownership of a token on the blockchain and does not automatically confer the copyright of the work unless there is an additional agreement.

Further examination reveals that as a "tokenized asset," NFTs are also regarded as a new form of property and do not fully conform to the legal handling methods of traditional rules [2].

Evidence law mainly deals with whether blockchain data can be used in legal proceedings. For example, on-chain data such as transaction records need to be verified for their authenticity, reliability, and relevance to the case before they can be accepted by the court to support infringement determination or compensation calculation. This also involves some basic requirements in digital forensics, such as whether the data is complete and whether it has been tampered with.

3.2. Data Sources

The data utilized in this study are publicly accessible and primarily categorized as follows:

Publicly available NFT copyright dispute judgments, including those from the Hangzhou Internet Court, Beijing Intellectual Property Court, courts in the United States such as the Southern District Court of New York, and certain courts in European countries. These judgments can be accessed through official court websites or legal databases [11].

Another category comprises transaction data from major NFT platforms, such as OpenSea, LooksRare, and Rarible. Information including creation time, transfer records, transaction prices, and royalty payments can be retrieved via blockchain browsers like Etherscan or platform interfaces.

This category also includes rule documents from the platforms themselves, such as user agreements and copyright policies, which outline the responsibilities of the platform and its users in cases of infringement [1].

Additionally, this study references legal and policy documents from various judicial jurisdictions, including directives on copyright in the digital market within the European Union, judicial interpretations of blockchain evidence in China, and reports from the US Copyright Office concerning digital assets.

3.3. Methodology

This research adopts the doctrinal research method and is divided into three main parts as a whole [12]. The specific process is illustrated in Figure 1.

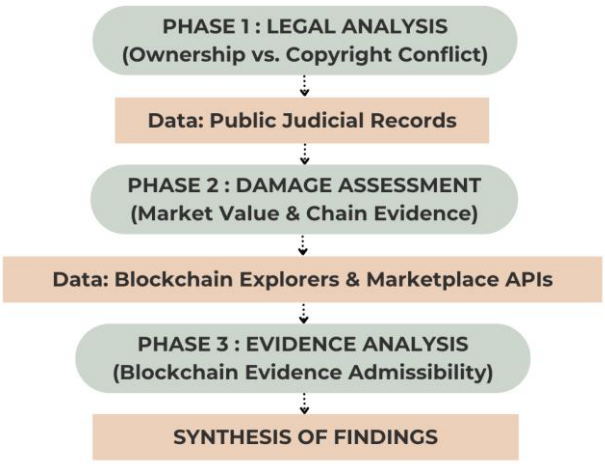

Figure 1. Research Methodology Flowchart

Initially, the focus was on the conflict between NFT ownership and copyright. By reviewing relevant cases, recurring issues were identified, such as whether creating a work into an NFT constitutes "copying," whether transferring an NFT involves the right of distribution, and under what circumstances platforms may be held responsible for infringing content published by users.

Subsequently, the focus shifted to the calculation of compensation. In practice, courts often choose among several approaches, including assessing the actual losses of rights holders, the profits earned by infringers from NFT sales, and statutory compensation. Additionally, trading data in the market is considered to understand the sales situation of NFTs, including average prices, approximate price ranges, and royalty payment mechanisms [10].

The final part primarily examines the legal utilization of blockchain data and its extent. A key consideration is how courts determine whether these records can be accepted as evidence, such as transaction hashes, smart contract codes, and timestamps. Another common concern is whether the data were tampered with before being recorded on the blockchain, potentially affecting their credibility [8].

3.4. Analytical Approach

This study primarily employs qualitative analysis to organize and compare existing judgments and policy documents [13]. Through thematic coding, recurring issues across different judicial jurisdictions are summarized, including typical points of dispute, evidence requirements, and methods for calculating compensation.

The quantitative component serves as a supplementary aspect. All data are sourced from publicly available NFT transaction records. This study neither generated its own data nor conducted complex modeling [14]. Instead, it focused on organizing existing data, such as transaction volumes, price distributions, and the general status of royalty payments.

All conclusions are based on publicly available data and can be independently verified using the same sources. This study did not utilize any proprietary or confidential information.

4. Findings and Discussion

4.1. Conflict between NFT Ownership and Copyright

The ownership and copyright of NFTs are distinct concepts. The blockchain records the ownership of the token itself, but this does not inherently grant copyright over the associated work. Consequently, infringement issues frequently arise, particularly when works are created and sold as NFTs without proper authorization. The lack of stringent review mechanisms on certain platforms exacerbates the likelihood of such occurrences.

Table 1 provides a summary of typical infringement scenarios and the corresponding legal determinations, compiled from publicly available judgments.

Table 1. Typical Infringement Scenarios and Legal Determinations

Infringement Scenario	Core Legal Issue	Judicial Determination
Unauthorized minting of copyrighted works	Whether minting constitutes reproduction	Constitutes infringement of reproduction right
Secondary sale of infringing NFTs	Whether transfer constitutes distribution	Constitutes infringement of distribution right
User misunderstanding of rights scope	Whether ownership implies copyright	Ownership does not equal copyright transfer
Platform failure to review	Whether platform bears secondary liability	Liable for failure to fulfill duty of care

4.2. Identification of NFT Infringement

When the court determines whether an infringement has occurred, it generally considers whether the work itself is protected by copyright, whether the defendant has accessed the work, and whether the NFT is highly similar in content to the original work.

In many cases, the minting and trading of NFTs are also regarded as acts of information dissemination.

Table 2 summarizes these judgment elements and the specific review focuses of the courts.

Table 2. Elements of Infringement Identification

Identification Element	Key Review Point
Existence of copyright	Valid copyright and term of protection
Accessibility	Defendant had reasonable access to the work
Substantial similarity	Expression part is highly similar
Act type	Minting and trading conform to dissemination
Lack of permission	No license or legal exception

4.3. Damage Calculation Based on Market Value and on Chain Evidence

Determining the amount of compensation can be challenging. The prices in NFT markets are highly volatile, and there is no standardized reference for licensing fees. Furthermore, it is essential to establish that the infringement directly caused the claimed losses. In practice, courts often combine blockchain transaction data with statutory compensation as the primary basis for judgment.

Table 3 outlines the commonly used methods for calculating compensation and the corresponding data sources referenced in such evaluations.

Table 3. Damage Calculation Methods and Data Sources

Calculation Method	Basis	Data Source
Actual loss	Market value and licensing fees	Platform transaction statistics
Infringer's profits	Sales volume and unit profit	Blockchain transaction records
Statutory compensation	Work value and fault degree	Judicial guidelines and typical cases
Hybrid method	Market value plus transaction history	Blockchain and platform data

4.4. Legal Effectiveness of Blockchain Evidence

Blockchain records can effectively demonstrate transaction facts, including the time, object, and price of the transaction [15, 16]. However, their evidentiary strength is relatively limited in cases involving unauthorized copying activities. Courts will only accept such data if its authenticity, reliability, and relevance to the case are confirmed.

Table 4 provides a summary of the scope covered by blockchain evidence and highlights the differences in its probative force.

Table 4. Scope and Effectiveness of Blockchain Evidence

Evidence Type	Proof Scope	Judicial Effectiveness
Transaction hash	Transaction uniqueness and traceability	High effectiveness

Timestamp	Time of minting and transfer	High effectiveness
Wallet address	Transaction subject identity	Medium effectiveness
Smart contract	Rights and obligation setting	Medium effectiveness
Metadata	Work content and attribution	Needs corroboration

Blockchain evidence has proven to be practical in transaction tracking and compensation calculation. It has also improved the efficiency of copyright protection in NFT transactions. By combining market value with on-chain records, a balance can be maintained between safeguarding rights and fostering industry development [16].

5. Conclusion

This study focuses on analyzing the conflicts between blockchain "ownership" and traditional copyright, the standards for infringement determination, the methods for calculating compensation, and the legal validity of blockchain evidence. Based on the review of public judgments, on-chain transaction records, platform rules, and regulatory documents, a systematic summary of the key issues in NFT-related copyright disputes was conducted.

Research has shown that the ownership of NFT tokens and the copyright of the underlying digital works represent two distinct legal rights. This separation of rights leads to a continuous risk of infringement during the processes of minting, listing, and secondary trading of NFTs. Judgments in different jurisdictions have gradually developed relatively consistent principles of judgment: when the work is protected by copyright, the defendant has accessed the work, the content is highly similar, and there is no authorization, the related NFT actions are usually deemed as infringement.

As for damages compensation, the current rules face significant challenges in the NFT context. The prices of digital assets fluctuate greatly, there is a lack of a unified licensing fee standard, and it is also difficult to prove the causal relationship between infringement and economic losses. These factors all affect the determination of the compensation amount. Combining market value with on-chain transaction records can help improve the rationality of compensation calculation.

Blockchain evidence plays a significant role in verifying transaction facts, enabling the determination of transaction time, participants, prices, and flow paths. It has been adopted in multiple judicial jurisdictions. However, it still has limitations in proving unauthorized copying or usage and usually requires the combined use of off-chain evidence.

The governance of NFT transactions requires a balance to be struck between copyright protection and technological development. Platforms should enhance the copyright review before token creation and improve the information disclosure mechanism. Legislative and judicial practices need to further clarify the legal attributes of NFTs, unify the rules for infringement identification and compensation, and also refine the applicable standards for blockchain evidence. The understanding of market participants regarding the boundaries between NFT ownership and copyright also directly affects their legal risks.

Overall, the synergy of platform governance, legal rules, and technical mechanisms helps to reduce infringement risks and promote the standardized development of the NFT market. This study, based on public data, systematically reviewed the issues related to digital asset copyrights and provided a reference path for handling related disputes. The data used in the research all come from verifiable public sources, and the conclusions are reproducible.

This study still has certain limitations. With the rapid changes in the NFT business model and regulatory environment, some new issues, such as cross-chain NFTs and highly decentralized platforms, have not been fully incorporated into the analysis. Future research can further focus on the adjustment of copyright rules under the background of new technologies, the cross-border application of blockchain evidence, and more standardized licensing designs for smart contracts to support the continuous development of the digital asset industry.

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