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Актуальные проблемы современности

Actual Problems of the Present

№1 (51)

Қарағанды
Болашақ-Баспа
2026

ҚАЗІРГІ ЗАМАНҒЫ МАҢЫЗДЫ МӘСЕЛЕЛЕР

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Legal protection for NFT digital collectibles

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Abstract

The rapid development of blockchain technology has led to the emergence of NFT-based (non-fungible token) digital collectibles, which are becoming a new direction within the digital economy and the cultural industry. NFT technology enables the uniqueness of digital assets, verification of ownership, and transparency of transactions. However, this phenomenon also generates a number of complex legal issues. In particular, the uncertain legal status of NFT assets, risks of intellectual property infringement, and the lack of clearly defined mechanisms for platform liability and user rights protection pose significant challenges to existing legal systems. Therefore, a comprehensive academic analysis of the legal protection of NFT digital collectibles is of particular relevance. The purpose of the study is to determine the legal nature of NFT digital collectibles, analyze the main theoretical approaches to their legal status, and substantiate regulatory mechanisms aimed at reducing legal risks in the NFT market. The study applies the method of literature analysis. Relevant domestic and international academic publications on NFT technology, digital asset law, and intellectual property were examined, alongside an analysis of current legislation and judicial practice. In addition, practical legal disputes and real cases related to the functioning of the NFT market were reviewed. The research identifies two main legal characteristics of NFT digital collectibles. First, NFT certificates recorded on blockchain platforms possess the legal status of data-based property rights. Second, the underlying digital content associated with NFTs should be considered a form of virtual property. Furthermore, the study substantiates the need to classify NFT trading platforms, depending on their business models, as either technical service providers or content service providers. It also demonstrates the necessity of proportionally allocating legal responsibilities to platforms based on their control capabilities and the extent of economic benefits they derive. The proposed approaches contribute to improving the legal regulatory framework for NFT digital collectibles, strengthening intellectual property protection, and clarifying legal relations between platforms and users. The findings may serve as a theoretical foundation for developing effective governance mechanisms for the digital asset market and ensuring its sustainable and secure development.

Keywords: NFT digital collectibles, data rights, virtual property, intellectual property, legal protection.

NFT сандық коллекцияларын құқықтық қорғау

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Аңдатпа

Блокчейн технологиясының кең таралуы нәтижесінде NFT (non-fungible token) негізіндегі сандық коллекциялық активтер цифрлық экономика мен мәдени индустрияның жаңа бағыты ретінде қарқынды дамып келеді. NFT технологиясы цифрлық активтердің бірегейлігін, меншік құқығын тіркеуді және транзакциялардың ашықтығын қамтамасыз етуге мүмкіндік береді. Алайда бұл құбылыс құқықтық реттеу жүйесінде бірқатар күрделі мәселелерді туындатуда. Атап айтқанда, NFT активтерінің құқықтық мәртебесінің анықталмауы, зияткерлік меншік құқықтарының бұзылу қаупі, платформалардың жауапкершілігі мен пайдаланушылардың құқықтарын қорғау механизмдерінің жеткіліксіздігі қазіргі құқықтық жүйелер үшін жаңа сын-қатерлер қалыптастырады. Осыған байланысты NFT сандық коллекцияларын құқықтық қорғау мәселесін ғылыми тұрғыдан талдау өзекті болып табылады. Зерттеудің мақсаты – NFT сандық коллекцияларының құқықтық табиғатын анықтау, олардың құқықтық мәртебесіне қатысты негізгі теориялық тұжырымдарды талдау және NFT нарығындағы құқықтық тәуекелдерді азайтуға бағытталған реттеу механизмдерін негіздеу. Зерттеу барысында ғылыми әдебиеттерді талдау әдісі қолданылды. NFT технологиясы, цифрлық активтер құқығы және зияткерлік меншік саласындағы отандық және шетелдік ғылыми еңбектер қарастырылып, қолданыстағы құқықтық актілер мен сот тәжірибелері сарапталды. Сонымен қатар NFT нарығындағы нақты құқықтық даулар мен практикалық мысалдар талданды. Зерттеу нәтижесінде NFT сандық коллекцияларының екі негізгі құқықтық сипаты айқындалды: біріншісі – блокчейнде тіркелетін NFT сертификаттарының деректерге қатысты мүліктік мәртебесі, екіншісі – олардың негізіндегі цифрлық контенттің виртуалды мүлік ретінде қарастырылуы. Сонымен қатар NFT платформаларын олардың қызметтік ерекшеліктеріне қарай техникалық қызмет көрсетушілер және контент қызметін ұсынушылар ретінде жіктеу қажеттілігі негізделді. Платформалардың бақылау мүмкіндіктері мен экономикалық пайда алу деңгейіне сәйкес құқықтық жауапкершілікті пропорционалды түрде белгілеу қажеттілігі көрсетілді. Ұсынылған тұжырымдар NFT сандық коллекцияларын құқықтық реттеу жүйесін жетілдіруге, зияткерлік меншік құқықтарын қорғауға және платформалар мен пайдаланушылар арасындағы құқықтық қатынастарды нақтылауға мүмкіндік береді. Зерттеу нәтижелері цифрлық активтер нарығын құқықтық тұрғыдан тиімді басқару және оның қауіпсіз дамуын қамтамасыз ету үшін ғылыми-теориялық негіз бола алады.

Кілт сөздер: NFT сандық коллекциялары, деректер құқықтары, виртуалды меншік, зияткерлік меншік, құқықтық қорғау.

Правовая защита цифровых предметов коллекционирования NFT

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Аннотация

Широкое распространение блокчейн-технологий привело к быстрому развитию цифровых предметов коллекционирования на основе NFT (non-fungible token), которые становятся новым направлением цифровой экономики и культурной индустрии. Технология NFT обеспечивает уникальность цифровых активов, подтверждение права собственности и прозрачность транзакций. Однако данное явление вызывает ряд сложных правовых проблем. В частности, неопределенность правового статуса NFT-активов, риски нарушения прав

интеллектуальной собственности, а также недостаточная определенность ответственности платформ и механизмов защиты прав пользователей создают серьезные вызовы для существующих правовых систем. В этой связи научный анализ правовой защиты цифровых предметов коллекционирования NFT приобретает особую актуальность. Цель исследования – определить правовую природу цифровых предметов коллекционирования NFT, проанализировать основные теоретические подходы к их правовому статусу и обосновать механизмы регулирования, направленные на снижение правовых рисков на рынке NFT. В исследовании использован метод анализа научной литературы. Были изучены отечественные и зарубежные научные публикации, посвященные технологии NFT, праву цифровых активов и интеллектуальной собственности, а также проведен анализ действующего законодательства и судебной практики. Дополнительно рассмотрены реальные правовые споры и практические кейсы, связанные с функционированием рынка NFT. В ходе исследования определены две основные правовые характеристики цифровых предметов коллекционирования NFT: во-первых, имущественно-правовой статус NFT-сертификатов как данных, фиксируемых в блокчейне; во-вторых, статус базового цифрового контента как виртуального имущества. Кроме того, обоснована необходимость классификации NFT-платформ в зависимости от их бизнес-моделей на поставщиков технических услуг и поставщиков контент-услуг. Показана необходимость пропорционального распределения юридической ответственности платформ с учетом их возможностей контроля и степени извлекаемой экономической выгоды. Предложенные положения способствуют совершенствованию системы правового регулирования цифровых предметов коллекционирования NFT, обеспечению защиты прав интеллектуальной собственности и уточнению правовых отношений между платформами и пользователями. Результаты исследования могут служить научно-теоретической основой для формирования эффективных механизмов правового управления рынком цифровых активов и обеспечения его устойчивого развития.

Ключевые слова: цифровые предметы коллекционирования NFT, права на данные, виртуальная собственность, интеллектуальная собственность, правовая защита.

1. Introduction

With the widespread adoption of blockchain technology, NFT digital collectibles have rapidly emerged as a novel form of digital assets, demonstrating significant potential in copyright protection, asset ownership confirmation, and cultural dissemination. However, technological innovation has also brought challenges such as ambiguous legal attributes, compounded transaction risks, and lagging regulatory frameworks, posing serious challenges to existing property rights systems and platform accountability mechanisms. This paper aims to clarify the complex legal attributes of NFT digital collectibles, systematically analyze their derivative risks, and ultimately establish a legal regulatory framework tailored to their technological characteristics through three dimensions: legislative improvements, user rights protection, and platform governance.

Non-fungible tokens (NFTs), built upon blockchain technology, are cryptographic credentials designed to identify digital asset ownership. Their defining characteristics include uniqueness, non-interchangeability, and indivisibility. Technically, NFTs are smart contract-managed code segments deployed on the blockchain. The inherent transparency, traceability, and tamper-resistance of blockchain ensure the credibility of NFT transaction records (Qin et al., 2021). Specifically, blockchain functions as a decentralized distributed database where all transaction information is recorded through a chain of interconnected blocks (Yong, & Wang, 2016). Smart contracts, which execute automatically when predefined conditions are triggered, govern the creation and transfer of NFTs. This technological foundation endows NFTs with key attributes: non-replicability, indivisibility, and transparent public accessibility.

In practical terms, NFTs realize their "digital collectible" value by associating with specific digital assets such as artworks and collectibles. It's crucial to clarify that NFTs themselves, as metadata, merely serve as identifiers referencing underlying digital content - the two are

fundamentally separate. This technical characteristic directly shapes their legal attributes: NFT uniqueness ensures exclusive rights claims, traceability safeguards transaction security, while smart contract automation may establish novel legal relationships. Therefore, understanding these underlying technical principles forms the logical foundation for analyzing subsequent legal risks and ownership issues.

The idealized development model for NFT digital collectibles involves their issuance and storage on public blockchains, enabling transactions using cryptocurrencies like Ethereum while supporting unrestricted secondary market trading with no time or quantity limitations. Under this framework, NFT holders would theoretically enjoy exclusive rights to possess, utilize, profit from, and dispose of these assets. However, due to China's unique national conditions and the operational characteristics of domestic platforms, the actual rights of NFT holders remain incomplete. This study therefore explores the legal attributes of NFT digital collectibles by analyzing their technical essence and examining the current regulatory landscape.

In China, the legal classification of NFT digital collectibles has been examined through five perspectives: property rights, intellectual property, creditor's rights, rights aggregation, and virtual property. The rights aggregation theory is now widely regarded as the most reasonable framework. NFTs, as "encrypted digital certificates," are fundamentally machine-generated data. Digital collectibles represent a virtual underlying digital asset, essentially a form of virtual property. NFT digital collectibles emerge from the integration of NFTs as a technical element and virtual products as a content element, with their deep interconnection. However, due to China's unique national conditions, NFTs are not merely a simple property right, intellectual property right, or any single new type of property right, but rather a comprehensive aggregation of rights involving multiple stakeholders.

Current academic discourse on the legal attributes of NFT digital collectibles faces limitations in mainstream theories such as the property rights theory, creditor's rights theory, and intellectual property rights theory, all of which struggle to fully encompass their complex characteristics. The property rights theory posits that NFTs, as code segments stored on the blockchain, do not constitute tangible objects. User rights are often restricted by platforms and lack genuine exclusivity, making them unsuitable as property rights objects. The creditor's rights theory treats NFTs as instruments for claiming network services, but this interpretation conflicts with the Civil Code's provisions on creditor's rights objects while overlooking their universal economic value as property interests, rendering it logically inconsistent (Ma, & Wang, 2023). The intellectual property rights theory only applies to rare cases where users directly create original works, failing to address mass production activities like minting existing physical items into contracts that lack originality. Consequently, transforming NFTs into intellectual property objects faces legal obstacles (Wang, 2022).

In conclusion, NFT digital collectibles possess partial attributes of property rights, creditor's rights, and intellectual property rights, yet do not fully belong to any single category. Given their unique technical nature, it is more appropriate to characterize them as a combination of data and virtual network property involving multiple rights. This perspective aligns with the academic concept of "diversified legal characterization," which acknowledges that NFTs may simultaneously manifest as digital assets or rights certificates in practice, rather than pursuing a binary "either-or" solution (Jia, & Yao, 2024). This theoretical framework provides a foundation for implementing precise regulatory classification in subsequent implementation.

2. Method

This paper employs **literature analysis method**. By analyzing and compiling relevant legal literature on NFTs, it identifies loopholes in the current legal regulation of NFTs. Furthermore, this paper analyzes existing laws and proposes methods to remedy these deficiencies.

3. Results

1. Legal Risk Analysis of NFT Digital Collectibles

As the core of the NFT ecosystem, platforms bear the primary operational and regulatory risks. Intellectual property infringement stands as the foremost challenge, as evidenced by the landmark "First NFT Infringement Case" (the "Not I, Fat Tiger" case) adjudicated by the Hangzhou Internet Court in 2022. The defendant platform was found guilty of aiding in the infringement of information network dissemination rights due to its failure to implement effective review mechanisms, allowing users to upload and mint unauthorized works. This case established that NFT platforms have a heightened duty of care compared to ordinary internet service providers, requiring them to establish intellectual property review systems rather than merely applying the "notice-and-takedown" rule.

Currently, domestic NFT digital artwork trading platforms are primarily categorized into two types: one is a self-operated B2C distribution platform, while the other adopts a C2C model where users upload their NFT artworks to the platform's dedicated blockchain and showcase them.

C2C platforms inherently carry heightened operational risks, particularly regarding indirect intellectual property infringement. The landmark NFT case primarily exposed regulatory failures in overseeing user-generated content, resulting in indirect IP violations. In contrast, B2C platforms face risks stemming from intentional copyright infringements. Additionally, these platforms confront extensive content compliance challenges. Practical cases include instances of converting pornographic images into NFTs for exhibition or creating video-based NFTs using deceased individuals' stories without family consent. Where regulatory oversight proves inadequate, platforms must assume corresponding liabilities (Hu, & Peng, 2022).

As market participants, users face multiple threats to their rights from project developers, platforms, and even other users. A striking example is the overseas "Evolved Apes" fraud case, where an anonymous developer absconded with funds after raising capital, leaving investors with losses. This incident highlights the fraud risks and legal challenges users face. Such cases reveal ambiguities in operational qualifications and legal liabilities of some platforms. If platforms arbitrarily shut down or project developers disappear, users may suffer substantial and irrecoverable economic losses. Currently, China's NFT digital collectibles protection efforts remain in their infancy, facing numerous issues that have become a bottleneck constraining the development of NFT protection in the country.

Moreover, users face not only infringement risks from platforms and telecom operators, but also significant risks among users themselves. Some NFT collectors violate platform rules by using illegal or unethical methods like unauthorized purchasing and maliciously exploiting purchase portals. Others engage in fraudulent activities such as scams and unauthorized transfers, causing substantial financial losses to ordinary NFT users.

Beyond the inherent risks of NFT collectibles, they also pose hidden dangers such as money laundering and illegal financial activities. This was vividly demonstrated in the 'OpenSea Insider Trading Case' prosecuted by the U.S. Department of Justice. In this case, former platform employees exploited their positions to purchase NFTs that were about to be promoted in advance and resold them at inflated prices. This not only involved suspected wire fraud and money laundering, but also exposed inherent regulatory loopholes in the NFT market.

Money Laundering Risks: NFT digital collectibles are highly susceptible to money laundering through reverse trading. This vulnerability stems from two key factors: First, their decentralized and anonymous nature makes them ideal tools for illegal transactions and money laundering. Second, the speculative nature of NFT prices can mask illicit fund sources. Compared to cryptocurrencies, laundering through NFTs proves more covert and efficient.

Financial Risks: On one hand, NFT digital collectibles may experience significant price volatility due to speculative trading. On the other hand, their inherent scarcity and substantial investment potential inherently predispose them to financialization and securitization, making them susceptible to financial manipulation. For instance, packaging NFTs as financial products to lure investors into speculative trading creates dual challenges for regulators and escalates financial risks at both national

and global levels. When the NFT craze subsides, the subsequent collapse of financial markets could severely impact economic stability.

2. Current Legal Framework and Legal Gaps for NFT Digital Collectibles

While NFT digital collectibles aren't fully protected under intellectual property laws, they can still receive copyright protection if they qualify as works under the Copyright Law. Regarding reproduction rights, many NFTs originate from digital adaptations of physical artworks. The act of uploading original works to platforms during NFT minting constitutes reproduction, which is governed by reproduction rights. In the "I Am Not Fat Tiger" case, users were deemed to have infringed reproduction rights by uploading works without authorization.

Regarding the right of communication through information networks, Article 10(1)(12) of the Copyright Law stipulates that publishers must obtain authorization from copyright holders when listing digital works on trading platforms. The act of displaying digital works on platforms for public browsing and purchase constitutes "providing works to the public," which falls under the scope of the right of communication through information networks. Judicial practice generally holds that reproduction activities conducted for network dissemination are inherently incorporated into such communication rights. Therefore, unauthorized use of works by platforms to mint and sell NFT digital collectibles without permission constitutes infringement of the right of communication through information networks. The "I Am Not Fat Tiger" case also adopted this principle as the legal basis for determining infringement.

The Cybersecurity Law of the People's Republic of China, the Data Security Law of the People's Republic of China, and the Personal Information Protection Law of the People's Republic of China have been successively implemented, establishing a relatively complete and robust personal information protection system for China's internet sector. These three laws provide safeguards for personal information protection in the context of NFT digital collectibles. Additionally, Article 127 of the Civil Code, which addresses virtual property in cyberspace, offers guidance for judicial practice in determining the legal status of NFTs, though its specific application remains to be further clarified (Yuye, & Bin, 2022).

First, the legal framework remains ambiguous. The Civil Code lacks clear provisions on virtual property in cyberspace, with only Article 127 offering a general principle: 'Where laws provide for the protection of data and virtual property in cyberspace, such provisions shall apply.' While virtual property in cyberspace is recognized as a form of property right, its specific classification as an object of property right has yet to be conclusively determined (Ren, 2023).

Second, there are significant discrepancies in judicial practice. According to the Zhonglun Blockchain Legal Practice Report 2.0 Edition, among 507 court rulings involving NFT digital assets, only 66 explicitly defined their legal status - 17 affirming protection and 49 rejecting it. The absence of legislative definitions directly results in considerable uncertainty regarding the legal nature and protection approaches of NFTs in judicial practice.

Third, the absence of key legal principles - particularly the exhaustion of distribution rights and the principle of public trust - is particularly evident. On one hand, the application of the exhaustion of distribution rights principle in the digital environment has yet to be established through legislative or judicial confirmation. Although NFT transactions functionally resemble ownership transfers, both China's judicial practices (such as the "first NFT case") and mainstream Western perspectives have maintained reservations, thereby restricting the legal circulation of digital collectibles. On the other hand, the application of the public trust principle in intellectual property has not been established. NFT transactions rely on publicly disclosed blockchain records; if such information is inaccurate, the transaction becomes invalid, which undermines transaction security protection (Wang et al, 2024).

4. Discussions

First, legislation should strictly prohibit the financialization and securitization of NFT digital collectibles. We must abandon the "one-size-fits-all" approach and adopt a regulatory strategy of

"precise differentiation and categorized measures". By distinguishing NFTs from conventional financial products, we can prevent malicious actors from exploiting their collectible status to create investment vehicles (Shao, 2024). Drawing lessons from international frameworks like the U.S. Federal Securities Act, UK's Financial Conduct Authority (FCA), and the UK's Digital Currency Act, we could implement the "Hawley Test" standard from U.S. securities regulation. This would enable thorough scrutiny of NFT projects suspected of financing activities or profit guarantees. Projects meeting criteria such as "investment in a common enterprise with expected returns" should be classified as securities and incorporated into financial oversight. This dual approach not only curbs speculative trading and safeguards financial stability, but also creates healthy development space for digital collectibles with genuine cultural and collection value.

Secondly, the intellectual property law should incorporate specific provisions for NFT digital collectibles to fully protect the legitimate rights of creators and holders. This could be achieved by adopting France's legislative approach of treating NFTs as digital copyright assets, or by referencing U.S. regulations on copyright and trademark protection, thereby establishing a legal framework for NFTs within intellectual property law (Yang, 2022).

Although it is not yet time for comprehensive legislation, we should continue to track the development of NFT industry and strengthen prospective research on relevant domestic and foreign legal systems to reserve theoretical support for future legislation.

The rights framework of NFT digital collectibles comprises two distinct components: the ownership-identifying 'NFT rights certificate' and the underlying digital collectible as the object. These components possess distinct legal attributes and value dimensions. It is essential to legally define their respective classifications as 'data' and 'virtual network property' to implement categorized protection measures (Meng, & Yang, 2022).

NFT rights certificates are fundamentally metadata recorded on the blockchain. Although independent of the digital content they represent, their creation process embodies human labor and function as legal proof of rights with property attributes, thus deserving legal protection. To clarify the property nature of NFT rights certificates, establishing new legal frameworks for regulating this emerging asset class proves more reliable. This can be approached through the "functional equivalence principle," which posits that NFTs - by virtue of their unique identifiers, disposability, and blockchain's public credibility - have achieved functional parity with traditional "things" (Peng, 2023). Article 127 of China's Civil Code stipulates: "Where laws provide for the protection of data and virtual property, such provisions shall apply." This provision specifically addresses this unique right, though current Chinese legislation has yet to address it. The next step should involve specialized legislation to establish legal protection mechanisms for data property rights.

NFTs (Non-Fungible Tokens) are data-based value proofs where owners retain corresponding data rights. The rights certificates of NFTs should include the following aspects. First, right holders have the right to be informed. Rights holders are entitled to know the content and scope of information recorded on the blockchain by the platform. Platforms must notify rights holders in advance about collected personal information and obtain their consent. Second, right holders maintain control over non-fungible tokens. Since digital artworks rely on platforms for existence, the rights enjoyed by right holders are relative. However, platforms remain responsible for accurately recording relevant data and ensuring its continuous and stable preservation. If records are lost due to system instability or bankruptcy, it constitutes infringement of rights holders' rights, requiring platforms to assume liability for damages. Third, right holders possess disposal rights. When necessary, they may transfer or relinquish rights voluntarily, destroying related data in the process. These rights can also be transferred through gifts or inheritance.

First, legal frameworks should explicitly recognize users 'virtual property rights over contracts between NFT digital collectibles providers and rights holders, as well as virtual spaces created by platforms. The ownership rights of digital collectibles encompass multiple dimensions. Firstly, rights holders can protect their property rights based on the collectibles' intrinsic value, and seek compensation through factors like original pricing when infringements occur. Secondly, copyright

protections are absent in virtual property ownership. While digital cultural works retain their original copyright to publishers or creators (unless otherwise stipulated), platforms must ensure their collectibles avoid copyright disputes through proper copyright verification. Thirdly, rights holders maintain relative control and disposal rights. These rights, akin to property rights in physical works, allow digital collectibles to be gifted, relinquished voluntarily, bequeathed, or inherit naturally under specific conditions.

An analysis of domestic platforms reveals that the "digital collectibles" launched by Ant Group, Tencent, and JD.com are all developed on their own consortium chains, which should be classified as private blockchains. This implies that these platforms have strong technical control over activities on private blockchains. Consequently, NFT platforms should be regarded as regulatory bodies for potential risks and legally obligated to conduct content reviews.

When fulfilling their review obligations, platforms must examine user-submitted digital collectibles and promptly implement necessary measures against identified infringing content. The type and severity of these measures directly impact user rights, requiring careful determination of appropriate actions. Beyond legally mandated methods like blocking, deletion, or link removal, judicial practices also recognize alternative measures such as transfer notifications, user behavior restrictions, and service termination. Given the inherent difficulty in completely erasing NFTs once they're on-chain, traditional enforcement approaches often prove ineffective. Therefore, it's crucial to explore innovative regulatory mechanisms that align with blockchain technology's unique characteristics.

Since NFT digital collectibles service platforms derive economic benefits from users 'minting and trading activities, they bear a heightened duty of care compared to ordinary internet service providers. In this context, the transfer notification mechanism, as a precautionary measure, should serve as the baseline regulatory framework for these platforms. Building upon this foundation, more stringent regulatory measures should be implemented to govern users' minting and trading behaviors.

NFT digital collectibles platforms can implement progressive regulatory measures for user minting and trading activities based on their business models, while establishing user manuals and governance rules. For first-time violators, platforms may apply "lenient" measures such as error logs, warnings, transaction frequency restrictions, and enhanced content moderation for minted works. In cases of repeat offenses, platforms may permanently ban the NFT account from the platform's ecosystem.

As the central organizer of the NFT ecosystem, the platform should be designated as the "primary responsible party". Its legal status aligns more closely with that of an "information storage space service provider" under the Regulations on the Protection of the Right of Communication Through Information Networks, with liability assessment based on its business model (Peng, 2023). Since the platform earns commissions from each transaction, constituting "direct economic gain", it should therefore bear a heightened duty of care.

However, heightened duty of care does not equate to indiscriminately imposing universal pre-approval requirements. Research indicates that hastily mandating platforms to actively filter all content may lead to multiple drawbacks, including exorbitant costs and restrictions on free speech. China should therefore avoid blindly adopting such practices (Feng, 2023). Instead, platform responsibilities should focus on establishing efficient intellectual property review mechanisms and post-event response protocols (Chen, & Friedmann, 2023).

As a nascent phenomenon, NFT digital collectibles are still in their developmental phase. Therefore, when exploring regulatory measures for NFT digital collectibles service platforms, we may boldly draw upon the principle of proportionality in administrative law to provide reference for future court rulings.

First is the suitability review, which requires that implemented measures must achieve the intended purpose or at least contribute to its attainment while being appropriate means. In the NFT digital collectibles ecosystem, where users repeatedly infringe upon others' rights, the inherent limitations of blockchain technology may prevent aggrieved parties from receiving compensation.

Moreover, even if NFT platforms remove infringing digital collectibles, such actions would fail to effectively deter violations. Therefore, under the suitability review framework, these measures should not be adopted by platforms.

The third aspect involves necessity review, which refers to the process of selecting the method with the least infringement on user rights among available legal means after confirming the appropriateness (Lee, 2023). In the context of NFT digital collectibles, it is essential to ensure both the healthy development of NFTs and effective prevention of infringement. For first-time offenders, measures like penalizing them with "black hole" penalties should be avoided to prevent unnecessary losses. Instead, approaches such as restricting transaction frequency and issuing warnings can achieve regulatory objectives while minimizing harm, thereby balancing the interests of all parties involved.

The final consideration is proportionality, requiring that measures taken must be proportionate to their intended purpose. When an NFT platform removes infringing works from its platform, it should reassess whether the resulting user harm aligns with the benefits of rights protection through a positive proportionality test (Guo, & Fan, 2023).

In conclusion, NFT platforms should establish a systematic intellectual property protection mechanism and corresponding infringement resolution rules. If the platform fails to fulfill these obligations and provides substantial assistance to infringement, it may constitute indirect infringement and bear corresponding civil liability.

5. Conclusion

As an emerging product integrating digital technology and cultural creativity, NFT digital collectibles urgently require a corresponding legal protection system for their healthy development. The key to resolving current legal dilemmas lies in accurately defining NFTs - treating them as digital rights certificates while recognizing the underlying digital content as virtual property. This distinction clarifies their complex legal attributes and lays the foundation for precise classification and regulation. At the regulatory level, efforts should focus on legislating their non-financial positioning, improving copyright-related rules, and establishing tiered responsibilities based on platform control capabilities and profit models. As the digital economy deepens, it becomes essential to build a dynamic and balanced NFT legal governance framework through coordinated efforts in legislation, judiciary, and platform governance, ensuring both industrial innovation and transaction security.

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Conflict of Interest

The authors declare no conflicts of interest.

Author Contributions

The two authors contribute equally to this paper. The first author finished the first version of this paper, the corresponding author verified it and completed the form of this paper, then submitted it to this journal.

Data availability

The data used in this article are available upon request from the authors.

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