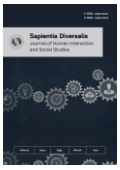

Sapientia Diversalis Journal of Human Interaction and Social Studies
Vol 1 No 1 February 2026, Hal 91-102
ISSN: 3125-1269 (Print) ISSN: 3125-0696 (Electronic)
Open Access: https://researchfrontiers.id/sapientiadiversalis

Copyright Protection in NFT Transactions Involving Blockchain-Based Digital Assets

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Article Info :
Received:
27-01-2026
Revised:
07-02-2026
Accepted:
16-02-2026

Abstract

The rapid expansion of blockchain technology and the emergence of Non-Fungible Tokens (NFTs) have transformed digital ownership models and generated significant challenges for contemporary copyright law. This study examines the legal relationship between NFT ownership and copyright protection, analyzes the legal issues arising from blockchain-based digital asset transactions, and evaluates the regulatory implications for Indonesia. Employing a normative legal research design with conceptual, comparative, and doctrinal approaches, the study analyzes statutory regulations, legal doctrines, and scholarly literature concerning NFTs, blockchain governance, and intellectual property rights. The findings indicate that NFT ownership does not automatically transfer copyright ownership of the underlying digital work, creating substantial legal uncertainty regarding licensing, royalty distribution, authorship recognition, and rights enforcement. Although blockchain technology offers innovative mechanisms for authentication, traceability, and automated royalty management through smart contracts, these technological features remain insufficient to resolve fundamental legal questions concerning copyright ownership and infringement. The study further identifies regulatory gaps within Indonesia's existing legal framework, particularly the inability of current copyright and digital transaction regulations to adequately address decentralized digital asset ecosystems. The research recommends regulatory reform focused on clarifying ownership rights, strengthening copyright protection mechanisms, and developing adaptive governance frameworks capable of accommodating technological innovation while ensuring legal certainty.

Keywords: *Blockchain, Copyright Protection, Digital Assets, NFT, Regulatory Reform.*

INTRODUCTION

The rapid expansion of blockchain technology over the past decade has not only transformed global financial infrastructures but has also redefined the conceptual foundations of ownership, authenticity, and value creation within digital environments. Non-Fungible Tokens (NFTs) have emerged as one of the most influential innovations generated by blockchain ecosystems because they enable the tokenization of unique digital assets that can be authenticated, traded, and transferred through decentralized networks (Chohan, 2024). The unprecedented growth of NFT markets since 2021 has attracted artists, musicians, investors, technology firms, and policymakers into a newly developing digital economy characterized by programmable ownership and verifiable scarcity (Mayana et al., 2022). Digital artworks, virtual collectibles, gaming assets, and metaverse-related commodities have increasingly become subjects of high-value transactions that challenge traditional legal understandings of property and intellectual creations (Saroh et al., 2023). The growing valuation of NFT-based assets in international markets has challenged conventional assumptions regarding ownership and market value by demonstrating that digitally native creations can command levels of economic recognition previously associated primarily with tangible assets and traditional intellectual property markets. This transformation has intensified scholarly and regulatory attention toward the adequacy of existing legal frameworks in governing ownership claims associated with blockchain-based assets (Laser, 2024).

Existing scholarship has extensively examined NFTs from technological, economic, and intellectual property perspectives, yet the literature demonstrates considerable variation in how ownership rights are interpreted and regulated. Several studies argue that NFTs provide an effective mechanism for verifying provenance and strengthening the traceability of digital works through immutable blockchain records, thereby offering new opportunities for intellectual property management (Hapsari et al., 2023). Research focusing on copyright protection further suggests that blockchain infrastructures may facilitate stronger evidentiary mechanisms for creators seeking recognition and enforcement of their rights in digital markets (Gidete et al., 2022). Other scholars emphasize that NFT commercialization has generated innovative pathways for creators to monetize creative outputs while simultaneously expanding access to global audiences without reliance on conventional intermediaries (Hariri et al., 2023). Nevertheless, the assumption that technological verification automatically guarantees legal ownership remains highly contested. Critical analyses indicate that the technological architecture of NFTs often functions independently from substantive copyright entitlements, creating situations in which token ownership and intellectual property ownership become disconnected legal realities (Tan, 2024).

Although the distinction between token ownership and copyright ownership has been recognized in legal discourse, substantial conceptual ambiguities remain unresolved across jurisdictions and marketplace practices. Studies examining NFT transactions repeatedly demonstrate that purchasers frequently misunderstand the legal consequences of acquiring a token and assume that copyright privileges are automatically transferred together with digital ownership certificates (Zipan et al., 2022). Investigations into NFT marketplaces reveal that contractual terms governing copyright allocation are often fragmented, inconsistent, and inaccessible to ordinary users, producing asymmetries of information that increase the risk of infringement disputes (Darmawan & Sardjono, 2023). Research conducted in Indonesia similarly identifies significant uncertainty regarding the legal characterization of NFTs within existing intellectual property regimes and highlights the absence of explicit normative standards regulating blockchain-based creative assets (Aziz, 2022). These inconsistencies become even more problematic because NFT ecosystems operate across national borders while copyright protection remains largely dependent upon territorial legal frameworks. The resulting gap between technological innovation and legal interpretation has generated a fragmented body of knowledge that lacks a coherent framework capable of explaining how copyright protection should function in decentralized digital environments (Pakaya, 2025).

The persistence of these unresolved issues possesses significant scientific and practical implications because NFT markets continue to expand despite growing concerns regarding copyright infringement, unauthorized minting, and digital asset misappropriation. Contemporary studies indicate that blockchain immutability alone cannot prevent creators' works from being tokenized without authorization, particularly when verification mechanisms are weak or absent within marketplace infrastructures (Edbert et al., 2024). Emerging analyses further suggest that copyright violations associated with NFTs increasingly intersect with broader cybersecurity challenges, including identity manipulation, unauthorized access, and digital fraud within online ecosystems (Dzaky & Edrisy, 2025). Comparative legal scholarship emphasizes that regulatory fragmentation across jurisdictions complicates enforcement efforts and weakens legal certainty for creators, collectors, and intermediaries participating in global NFT markets (Ajakaye & Lawal, 2025). The practical consequences extend beyond individual disputes because uncertainty surrounding copyright ownership may undermine trust in digital economies and discourage sustainable participation by creative industries. Addressing these challenges requires a more integrated examination of legal doctrine, technological architecture, and governance mechanisms than has been achieved in much of the existing literature.

Against this backdrop, the present study positions itself within an emerging interdisciplinary conversation that seeks to bridge intellectual property law, blockchain governance, and digital asset regulation. Previous studies have predominantly concentrated on identifying legal problems or describing regulatory deficiencies, whereas fewer investigations have systematically explored how copyright protection mechanisms can be conceptualized in relation to the unique characteristics of blockchain-based ownership structures (Khausan & Taufik, 2025). Recent technological proposals involving multi-signature verification systems and multilayered blockchain security frameworks indicate promising directions for strengthening copyright governance, yet their legal implications remain insufficiently theorized within contemporary scholarship (Kim, 2025a). Regulatory innovation studies similarly suggest that adaptive governance instruments, including regulatory sandboxes, may offer pathways for balancing technological development with legal accountability, although their relevance to NFT copyright disputes remains underexplored (Durham, 2023). Research concerning legal protection for digital innovation in Indonesia also underscores the necessity of developing certainty-oriented regulatory frameworks capable of accommodating rapidly evolving technological ecosystems (Putra et al., 2025). Consequently, a comprehensive legal analysis that integrates ownership theory, copyright doctrine, and blockchain governance remains necessary to address unresolved questions concerning the protection of creative rights in NFT transactions.

This study aims to analyze the characteristics of NFTs from the perspective of digital ownership, identify the conceptual and juridical distinctions between NFT ownership and copyright ownership, examine copyright protection mechanisms within blockchain ecosystems, explore the legal challenges surrounding NFTs as intellectual property objects, and formulate recommendations for regulatory reform in Indonesia. By employing a normative legal research design supported by conceptual, comparative, and analytical approaches, this research seeks to generate a more coherent understanding of the relationship between blockchain-based ownership and copyright protection. The study is expected to contribute theoretically by clarifying the boundaries between technological ownership and intellectual property rights while advancing scholarly debates concerning digital asset governance. Methodologically, it offers an integrated analytical framework capable of connecting legal doctrine, technological infrastructures, and regulatory development within the evolving NFT ecosystem.

RESEARCH METHODS

The present study employs a non-empirical qualitative socio-legal research design, as it does not collect primary data from human participants but instead relies on normative and doctrinal analysis of copyright protection in NFT transactions involving blockchain-based digital assets. This approach is positioned within legal doctrinal research that emphasizes the interpretation of statutory frameworks, regulatory discourse, and scholarly literature to examine how NFT-based ownership is constructed within intellectual property regimes (Aziz, 2022). The primary sources of data include intellectual property legislation, policy documents, and blockchain-related regulatory texts, while secondary sources consist of peer-reviewed academic works discussing NFTs, digital ownership, and copyright challenges in decentralized systems (Laser, 2024). Source selection is conducted through purposive criteria, prioritizing literature that directly addresses the intersection of NFTs, blockchain governance, and copyright protection to ensure analytical relevance and conceptual depth (Tan, 2024). This design is particularly suitable for addressing normative ambiguities in emerging digital asset ecosystems where legal codification remains incomplete. It also enables a structured examination of how technological innovation challenges conventional legal classifications of ownership and rights.

The analytical process is carried out using a qualitative doctrinal and interpretive framework that synthesizes legal texts and academic arguments to identify conceptual inconsistencies and regulatory gaps in NFT copyright governance. The study applies structured thematic interpretation to examine how legal norms distinguish between token ownership and copyright ownership within blockchain-based ecosystems, particularly in relation to digital asset commercialization (Darmawan & Sardjono, 2023). Analytical rigor is ensured through systematic comparison of doctrinal interpretations across sources, allowing for consistency in identifying recurring legal ambiguities and governance challenges. The interpretive process is maintained through transparent documentation of analytical categories and critical cross-reading of legal and scholarly materials to ensure coherence and reliability in the conclusions drawn. This procedure also supports iterative refinement of legal concepts as new patterns emerge from the literature synthesis. Ultimately, the methodological framework ensures that the findings remain grounded in rigorous socio-legal reasoning while maintaining analytical transparency and scholarly robustness.

RESULTS AND DISCUSSION

NFT Characteristics in Digital Ownership Perspective

Non-Fungible Tokens (NFTs) represent a distinct category of blockchain-based digital assets characterized by non-fungibility, cryptographic uniqueness, and verifiable scarcity, which collectively differentiate them from fungible digital currencies. Unlike cryptocurrencies such as Bitcoin or Ethereum that can be exchanged equivalently, NFTs function as singular digital identifiers that encode ownership metadata into blockchain systems, thereby transforming digital files into traceable and marketable assets (Chohan, 2024). This technological transformation has expanded the scope of digital commodification, where artistic works, music, gaming items, and virtual collectibles are increasingly integrated into tokenized economies that operate across decentralized platforms (Mayana et al., 2022).

Within this context, NFTs do not merely represent technological artifacts but also reflect a broader socio-economic shift in how value and ownership are constructed in digital environments (Laser, 2024). The emergence of NFTs therefore signals a reconfiguration of digital property relations in which uniqueness becomes the central determinant of economic and symbolic value.

The operational structure of NFTs is grounded in blockchain technology, which ensures immutability, transparency, and traceability of all recorded transactions through distributed ledger systems. Each NFT contains embedded metadata that links the token to a specific digital asset, allowing verification of provenance, ownership history, and authenticity without reliance on centralized intermediaries. However, while blockchain guarantees technical verification of ownership transfer, it does not inherently establish intellectual property ownership over the underlying digital content. This distinction creates a critical conceptual gap between technological ownership recorded on-chain and legal ownership governed by copyright law, which remains essential in socio-legal interpretation of NFT transactions. To systematically conceptualize these characteristics, the structural attributes of NFTs and their implications for digital ownership can be synthesized as follows.

Table 1. Conceptual Characteristics of NFT as Digital Asset

Dimension	NFT Characteristics	Legal-Conceptual Implication
Uniqueness	Individually identifiable and non-fungible token	Establishes singular digital identity
Blockchain System	Decentralized distributed ledger	Ensures immutability and traceability
Metadata Function	Embedded ownership and asset linkage	Connects token to digital representation
Scarcity Mechanism	Algorithmically generated uniqueness	Produces artificial market value
Legal Interpretation	No automatic copyright transfer	Separates token ownership from IP rights

The analytical synthesis in Table 1 demonstrates that NFT characteristics are fundamentally rooted in technological architecture rather than juridical recognition of intellectual property. This reinforces the argument that blockchain systems construct ownership through computational validation mechanisms rather than legal attribution of authorship. Consequently, NFT ownership must be interpreted as a form of digital possession that exists parallel to, but legally distinct from, copyright ownership of the underlying creative work. Such a distinction becomes crucial in understanding the legal uncertainties that arise in NFT-based transactions within global digital marketplaces.

Accordingly, NFTs should be conceptualized as socio-technical instruments that mediate value exchange in digital ecosystems rather than as legal entities conferring intellectual property rights. Their existence reflects a broader transformation in which digital scarcity is artificially constructed through blockchain protocols, reshaping traditional notions of ownership, originality, and authenticity. This conceptual framing provides a foundational basis for analyzing subsequent legal tensions between NFT possession and copyright protection within decentralized technological environments. In this regard, the persistence of legal ambiguity surrounding NFT classification further highlights the gap between technological innovation and existing intellectual property doctrines, particularly in jurisdictions where blockchain-specific regulation remains underdeveloped (Tan, 2024). Moreover, the divergence between technical ownership and legal authorship intensifies the risk of misinterpretation among market participants regarding the scope of rights embedded in NFT transactions. This condition ultimately underscores the necessity of clearer doctrinal articulation to prevent conflation between token ownership and copyright entitlement in digital asset governance.

Boundaries of Ownership and Copyright in NFT-Based Digital Transactions

The legal boundary between NFT ownership and copyright ownership remains one of the most contested issues in contemporary digital intellectual property discourse, particularly as blockchain-based transactions increasingly mediate the commercialization of creative works. NFTs operate as digital certificates of ownership over tokens that reference underlying assets, yet such ownership does not automatically extend to the copyright embedded in the associated digital content. This separation reflects the classical principle in intellectual property law that distinguishes between ownership of a tangible or digital object and ownership of the intangible rights attached to it (Zipan et al., 2022). In practice, however, market behavior often reveals a conceptual conflation, where NFT purchasers assume that acquisition of a token equates to acquisition of full copyright control over the associated work. This misunderstanding contributes to recurring legal disputes in NFT marketplaces, particularly in relation to unauthorized reproduction and commercial exploitation of digital assets (Darmawan & Sardjono, 2023).

From a doctrinal perspective, copyright law in Indonesia under Law No. 28 of 2014 explicitly grants exclusive rights to creators, including economic and moral rights, which are not automatically transferred through secondary transactions unless explicitly stated in contractual agreements. NFT systems, by contrast, function through smart contracts that primarily regulate token transfer rather than intellectual property assignment, thereby creating a structural gap between technological execution and legal intention. This divergence becomes particularly significant when NFT marketplaces facilitate transactions without standardized licensing frameworks that clarify the scope of rights transferred alongside token ownership. The absence of uniform contractual standards results in fragmented interpretations of ownership rights across platforms, increasing legal uncertainty for both creators and buyers. This condition further illustrates that the legal infrastructure has not evolved at the same pace as blockchain-based commercialization practices, particularly in regulating digital ownership representation. Such misalignment often leads to inconsistent enforcement outcomes when disputes arise regarding unauthorized use of NFT-linked content. Consequently, the doctrinal gap between smart contract execution and copyright transfer mechanisms remains a critical issue in ensuring legal certainty within NFT ecosystems (Tan, 2024).

Table 2. Distinction Between NFT Ownership and Copyright Ownership

Aspect	NFT Ownership	Copyright Ownership
Legal Nature	Digital token possession	Intangible intellectual property rights
Scope of Rights	Transfer of blockchain-verified token	Exclusive rights to reproduce, distribute, adapt
Transfer Mechanism	Smart contract execution	Legal contract or statutory assignment
Regulatory Basis	Blockchain protocol rules	Copyright law (statutory framework)
Duration	Permanent unless transferred	Limited by statutory provisions

The comparison presented in Table 2 reveals a fundamental asymmetry between technologically defined ownership and legally recognized authorship, where NFT systems operate within a computational logic that does not inherently accommodate the normative structure of copyright law. This asymmetry generates interpretive challenges in determining whether NFT transactions imply implicit licensing or mere token transfer without intellectual property implications. Legal scholarship emphasizes that such ambiguity increases the risk of unauthorized exploitation of creative works in decentralized digital ecosystems (Hapsari et al., 2023). Consequently, the absence of explicit licensing mechanisms embedded within NFT smart contracts further exacerbates uncertainty regarding the scope of rights acquired by token holders. This situation is compounded by the fact that most NFT platforms prioritize transactional efficiency over legal clarity, thereby leaving critical gaps in rights communication at the point of sale. Such gaps often result in divergent user expectations regarding the extent of usage rights attached to digital assets. As a result, the interpretive burden is shifted to post-transaction dispute resolution mechanisms that are not always effective in decentralized environments.

The persistence of this boundary problem reflects a broader structural tension between decentralized technological innovation and centralized legal doctrines governing intellectual property protection. While blockchain ensures transparency in token transactions, it does not resolve the normative question of authorship attribution and rights allocation in creative works. This condition necessitates a more explicit integration of licensing principles into NFT design architectures to prevent misalignment between technological ownership and legal entitlement. In this context, NFT systems must be critically examined not only as technological infrastructures but also as legal-economic instruments that require clearer doctrinal articulation to avoid systemic misinterpretation in digital creative markets. Furthermore, the lack of harmonized international standards for NFT licensing intensifies jurisdictional fragmentation, making enforcement of copyright claims increasingly inconsistent across borders (Ajakaye & Lawal, 2025). This reinforces the urgency of developing interoperable legal frameworks that can bridge technological decentralization with coherent intellectual property governance.

Copyright Protection in the Blockchain Ecosystem

The blockchain ecosystem introduces a fundamentally different paradigm for copyright protection by embedding technological enforcement mechanisms directly into the infrastructure of digital transactions, thereby shifting part of the protection logic from legal institutions to computational systems. In contrast to conventional copyright enforcement that relies on post-violation litigation, blockchain enables ex ante protection through immutable record-keeping and automated execution of contractual terms embedded in smart contracts (Kim, 2025). This shift is particularly relevant in NFT-based ecosystems where digital content is continuously exchanged across decentralized marketplaces without centralized oversight. The integration of blockchain into copyright governance thus reflects an emerging hybrid model in which legal protection and technological enforcement operate in parallel rather than independently (Laser, 2024). However, this convergence does not eliminate legal uncertainty, particularly in relation to the scope and validity of rights encoded within blockchain systems.

Smart contracts represent one of the most significant innovations in blockchain-based copyright protection, as they enable automated execution of licensing terms, royalty distribution, and ownership transfer without intermediaries. These programmable contracts can embed copyright conditions such as usage limitations, resale royalties, and attribution requirements, thereby operationalizing intellectual property rights within the transactional layer of blockchain systems (Kim, 2025). Nevertheless, the legal enforceability of such smart contracts remains contingent upon recognition within traditional legal systems, which may not always align with code-based execution logic. This creates a dual-layer governance structure where technical compliance does not always guarantee legal validity, particularly in cross-jurisdictional NFT transactions. To systematically analyze the mechanisms of blockchain-based copyright protection, the following table summarizes the key technological instruments and their corresponding legal implications.

Table 3. Blockchain Mechanisms for Copyright Protection

Mechanism	Function in Blockchain	Copyright Protection Role
Smart Contracts	Automates execution of transaction rules	Enables programmable licensing and royalties
Immutability	Prevents alteration of recorded data	Strengthens evidence of authorship
Transparency	Public visibility of transaction history	Facilitates traceability of ownership
Timestamping	Records creation time of digital assets	Supports proof of originality
Decentralization	Eliminates central authority control	Reduces intermediary dependency

The analytical mapping in Table 3 demonstrates that blockchain provides a multi-layered technological infrastructure capable of supporting copyright protection through automated, transparent, and tamper-resistant systems. However, the effectiveness of these mechanisms is highly dependent on their integration with legally recognized frameworks, as blockchain outputs alone do not constitute enforceable legal rights. This limitation becomes evident in cases where smart contract terms conflict with statutory copyright provisions or where jurisdictional inconsistencies prevent enforcement of blockchain-based agreements (Tan, 2024). Consequently, blockchain should be understood as a complementary enforcement mechanism rather than a substitute for formal legal institutions.

The coexistence of technological enforcement and legal regulation reflects an evolving governance model in which copyright protection is increasingly distributed across both code and law. While blockchain enhances the efficiency and traceability of copyright management, it simultaneously introduces new challenges related to legal interpretation, jurisdictional enforcement, and contractual validity. This duality underscores the necessity of integrating doctrinal legal frameworks with technological design principles to ensure that copyright protection remains both technologically effective and legally enforceable in NFT-based ecosystems. This integration becomes increasingly urgent as NFT markets expand across jurisdictions with divergent legal standards, creating inconsistencies in how smart contract-based copyright provisions are interpreted and enforced (Ajakaye & Lawal, 2025). Moreover, the absence of standardized legal recognition for blockchain-generated evidence further complicates dispute resolution processes in copyright infringement cases involving digital assets. As a result, the sustainability of blockchain-based copyright governance depends on the convergence of legal harmonization and technological interoperability within global digital ecosystems (Tan, 2024).

Legal Problems of NFTs as Intellectual Property Objects

The legal classification of NFTs within intellectual property regimes remains highly contested, particularly in determining whether NFTs should be treated as independent copyrightable objects or merely as digital representations of pre-existing creative works. Within doctrinal analysis, NFTs are generally understood as cryptographic tokens that operate on blockchain systems and serve as identifiers rather than creative expressions protected under copyright law (Laser, 2024). This distinction is crucial because copyright protection is traditionally reserved for original works of authorship, whereas NFTs function as technological instruments that certify ownership of digital representations without necessarily embodying creative originality. The ambiguity between these two conceptual layers has contributed to widespread interpretive uncertainty in legal practice, especially in NFT marketplaces where tokenization is often conflated with authorship rights (Zipan et al., 2022). Consequently, the classification problem of NFTs becomes a foundational issue in determining the applicable scope of intellectual property protection.

From a normative legal perspective, copyright protection is granted to original expressions that are fixed in a tangible medium, while NFTs operate as metadata-linked tokens that reference such expressions without altering their legal status. This separation creates a dual-layer structure in which the underlying digital work may be protected by copyright, whereas the NFT itself exists as a separate digital asset without inherent intellectual property protection. However, in practice, NFT transactions often blur this distinction, as market participants may interpret token ownership as equivalent to ownership of the associated creative content. Such misinterpretations have led to disputes involving unauthorized reproduction and commercialization of digital works, particularly in decentralized platforms where verification mechanisms are limited (Gidete et al., 2022). To clarify the structural classification of NFTs within intellectual property law, the following analytical framework is presented in Table 4, which distinguishes between NFT tokens and underlying digital assets.

Table 4. Legal Classification of NFTs and Underlying Digital Assets

Component	Legal Status	Copyright Implication
NFT Token	Digital cryptographic asset	Not protected as creative work
Underlying Asset	Digital artwork or content	Protected under copyright law
Smart Contract	Execution protocol	Not an intellectual property object
Metadata	Descriptive linkage data	Supports identification, not authorship
Ownership Record	Blockchain-based registry	Evidence of possession, not copyright

The analytical structure in Table 4 highlights a clear doctrinal separation between NFTs and the creative works they reference, reinforcing the argument that NFTs do not inherently constitute copyrightable subject matter. This separation is essential in preventing legal misclassification that could otherwise extend intellectual property protection to non-creative technological elements. However, the persistence of interpretive ambiguity in practice suggests that market behavior often overrides doctrinal clarity, leading to inconsistent enforcement outcomes across jurisdictions. This condition reflects a broader tension between technological innovation and the rigidity of traditional intellectual property frameworks, particularly in decentralized digital environments.

The classification problem is further complicated by the increasing commercialization of NFTs as investment instruments rather than mere digital certificates of ownership. In such contexts, NFTs acquire economic value independent of the underlying creative work, thereby creating a secondary market that operates on speculative dynamics rather than copyright-based valuation. This phenomenon challenges conventional legal assumptions regarding the relationship between creative authorship and economic exploitation. As NFT ecosystems continue to evolve, the absence of clear legal boundaries between tokenization and intellectual property protection remains a significant obstacle to regulatory coherence and legal certainty in digital asset governance (Khausan & Taufik, 2025). This speculative orientation often leads to the decoupling of artistic intent from market valuation, where price formation is driven more by scarcity narratives and blockchain verification than by intrinsic creative merit. Such a condition further complicates legal attempts to anchor NFT value within established intellectual property frameworks that prioritize originality and authorship. Consequently, regulatory systems face increasing difficulty in distinguishing between investment-driven token trading and copyright-relevant exploitation of creative works.

Legal Vacuum of NFT Regulation in Indonesia

The regulatory landscape governing Non-Fungible Tokens (NFTs) in Indonesia remains fragmented, as existing legal instruments have not been specifically designed to address the unique characteristics of blockchain-based digital assets. While Law No. 28 of 2014 concerning Copyright provides a general framework for the protection of creative works, it does not explicitly regulate the tokenization of intellectual property in blockchain environments. Similarly, the Information and Electronic Transactions Law (UU ITE) acknowledges electronic data as legally valid, yet it lacks operational provisions addressing ownership transfer and copyright attribution in NFT transactions. This absence of explicit regulatory recognition creates uncertainty in determining the legal status of NFTs within Indonesia's intellectual property regime (Aziz, 2022). As a result, NFT-related transactions operate within a partially regulated space that depends heavily on interpretive legal reasoning rather than clear statutory guidance.

From a commercial regulation perspective, NFTs are indirectly governed through commodity-based classification under the supervision of BAPPEBTI, which regulates crypto assets as tradable financial instruments rather than intellectual property artifacts. This regulatory approach positions NFTs primarily as digital commodities, thereby overlooking their embedded cultural and creative dimensions. Consequently, the legal framework tends to prioritize transactional legality over copyright protection, leaving creators vulnerable to unauthorized use of their works in decentralized marketplaces. The absence of sector-specific regulation further exacerbates inconsistencies in enforcement, particularly when disputes arise between NFT platforms, creators, and buyers operating across different jurisdictions (Mayana et al., 2022). The resulting imbalance creates a regulatory environment in which economic transactions receive greater legal attention than the protection of creative rights attached to tokenized assets. This condition may discourage creators from fully utilizing blockchain-based commercialization mechanisms due to uncertainty regarding the enforceability of their intellectual property claims. Furthermore, the lack of clear institutional coordination among regulatory authorities complicates the development of a comprehensive governance model capable of addressing the multidimensional nature of NFT ecosystems.

Table 5. Regulatory Framework for NFT Governance in Indonesia

Legal Instrument	Regulatory Focus	Limitation in NFT Context
Copyright Law (UU 28/2014)	Protection of creative works	No explicit NFT/tokenization regulation
UU ITE	Validity of electronic transactions	Lacks IP-specific NFT provisions
BAPPEBTI Regulations	Crypto asset trading supervision	Treats NFTs as commodities, not creative assets

PP PMSE	Digital trade regulation	Does not address copyright attribution

The mapping in Table 5 demonstrates that Indonesia's current legal framework treats NFTs in a fragmented and functionally inconsistent manner, where different institutions regulate distinct aspects of NFT activity without a unified normative structure. This fragmentation results in regulatory overlap on the one hand and regulatory gaps on the other, particularly in relation to copyright attribution and enforcement in digital marketplaces. Such conditions reflect a broader institutional lag in adapting legal frameworks to rapidly evolving blockchain technologies, thereby limiting the effectiveness of existing protections for creators and consumers (Pakaya, 2025). The lack of harmonized regulatory standards also increases the risk of legal uncertainty in cross-platform NFT transactions.

The persistence of this regulatory vacuum highlights the urgent need for a more integrated legal framework that can accommodate both technological innovation and intellectual property protection. Without such integration, NFT governance in Indonesia will continue to rely on interpretive discretion rather than normative certainty, increasing the likelihood of inconsistent judicial outcomes. This situation underscores the importance of developing a coherent regulatory approach that bridges the gap between digital asset governance and copyright law in order to ensure legal clarity and market stability in blockchain-based ecosystems. A more comprehensive framework would also facilitate clearer delineation of rights and obligations among creators, marketplace operators, investors, and consumers within NFT transactions. Regulatory certainty is particularly important for fostering trust in digital asset markets and encouraging sustainable participation in blockchain-based creative industries. In the absence of such reforms, legal ambiguity is likely to persist as a structural barrier to the effective protection and commercialization of digital intellectual property assets (Putra et al., 2025).

Regulatory Reform Needs for Copyright Protection in NFT Transactions

The findings of this study indicate that the primary challenge facing NFT governance in Indonesia is not the absence of legal instruments altogether, but rather the inability of existing regulations to adequately address the convergence of blockchain technology, digital ownership, and copyright protection. Current legal frameworks continue to regulate intellectual property, electronic transactions, and crypto assets through separate institutional mechanisms, resulting in fragmented governance structures that are insufficient for the multidimensional nature of NFT ecosystems. This fragmentation generates uncertainty regarding the legal status of tokenized creative works, the enforceability of smart contract provisions, and the allocation of rights among creators, platforms, and token holders. Contemporary scholarship increasingly emphasizes that emerging digital asset markets require adaptive regulatory approaches capable of balancing innovation incentives with effective intellectual property safeguards (Aziz, 2022). Regulatory reform should therefore focus on establishing a coherent governance architecture that accommodates both technological developments and copyright protection objectives.

A central component of regulatory reform involves clarifying the legal relationship between NFT ownership and copyright ownership through explicit statutory provisions. Existing copyright doctrines provide a foundation for protecting creative works; however, they offer limited guidance regarding the legal consequences of tokenization and blockchain-based commercialization. Greater legal certainty could be achieved through legislative amendments that explicitly define the scope of rights transferred in NFT transactions and establish minimum disclosure standards concerning licensing arrangements. Such reforms would reduce interpretive ambiguity while strengthening market transparency for creators and purchasers. Comparative regulatory studies further suggest that clear statutory guidance remains essential for preventing disputes arising from divergent understandings of digital ownership and intellectual property rights in decentralized environments (Ajakaye & Lawal, 2025).

Table 6. Proposed Regulatory Reform Framework for NFT Copyright Governance in Indonesia

Regulatory Area	Current Limitation	Proposed Reform
Copyright Law	No NFT-specific provisions	Explicit recognition of NFT-related copyright transactions

Smart Contracts	Uncertain legal enforceability	Legal recognition of blockchain-based contractual arrangements
NFT Marketplaces	Limited copyright verification	Mandatory ownership and authorship verification systems
Dispute Resolution	Jurisdictional uncertainty	Specialized digital intellectual property dispute mechanisms
Regulatory Coordination	Fragmented institutional oversight	Integrated cross-agency governance framework

The framework presented in Table 6 demonstrates that effective NFT governance requires simultaneous reform across legislative, institutional, and technological dimensions rather than isolated amendments to individual regulations. Copyright protection can no longer be viewed solely through conventional legal enforcement mechanisms, as blockchain ecosystems increasingly depend on technological infrastructures that influence ownership verification and rights management. Recent studies have proposed integrating blockchain-based verification systems and enhanced digital security architectures to strengthen copyright enforcement while preserving the decentralized characteristics of NFT markets (Kim, 2025). Such approaches suggest that regulatory modernization should incorporate both legal certainty and technological functionality as complementary objectives rather than competing priorities.

Institutional strengthening also constitutes a critical element of future regulatory development. Regulatory authorities responsible for intellectual property, digital governance, and financial supervision require greater coordination to address overlapping issues arising from NFT transactions. Enhanced cooperation among agencies would facilitate more consistent enforcement practices, improve monitoring capabilities, and reduce jurisdictional fragmentation in cases involving copyright infringement and digital asset disputes. In addition, the establishment of regulatory sandbox mechanisms could provide a controlled environment for testing innovative governance models before broader implementation, allowing policymakers to respond more effectively to rapid technological change (Durham, 2023). This approach may contribute to a more adaptive and evidence-based regulatory ecosystem capable of accommodating future developments in blockchain technology.

The long-term sustainability of NFT-based creative economies depends on the development of regulatory systems that recognize the interconnected nature of technology, commerce, and intellectual property protection. Legal certainty is necessary not only for protecting creators from unauthorized exploitation but also for fostering trust among investors, collectors, and marketplace operators participating in blockchain-based transactions. Strengthening copyright governance within NFT ecosystems may also contribute to broader digital security objectives by reducing opportunities for cyber-enabled infringement and unauthorized commercialization of creative assets (Dzaky & Edrisy, 2025). A comprehensive regulatory framework that combines doctrinal clarity, institutional coordination, and technological adaptability would provide a stronger foundation for the responsible growth of Indonesia's digital asset economy while ensuring meaningful protection for copyright holders in decentralized environments (Saroh et al., 2023).

CONCLUSION

This study examines the legal relationship between copyright protection and NFT transactions involving blockchain-based digital assets, revealing that the rapid growth of NFT ecosystems has generated significant challenges for conventional intellectual property frameworks. The analysis demonstrates that NFT ownership and copyright ownership are fundamentally different legal concepts that operate within separate normative domains. Ownership of an NFT merely signifies control over a blockchain-based token and does not automatically confer the economic or moral rights associated with the underlying creative work. The findings indicate that this distinction remains insufficiently understood within digital marketplaces, creating uncertainty among creators, collectors, and investors regarding the scope of rights transferred through NFT transactions. The study also shows that the commercialization of NFTs has transformed digital works into tradable assets whose market value often extends beyond the copyright value of the underlying content. Such developments have intensified legal debates concerning authorship, ownership, licensing, and the protection of intellectual property in decentralized environments. The persistence of these debates illustrates that technological innovation has developed more rapidly than the legal doctrines designed to govern ownership relations. This condition reinforces the need for a clearer conceptual framework capable of distinguishing technological possession from legally recognized intellectual property rights.

The study further finds that blockchain technology possesses considerable potential to enhance copyright protection through immutable transaction records, transparent ownership histories, cryptographic authentication, and automated royalty distribution mechanisms embedded within smart contracts. These technological features provide creators with stronger tools for monitoring the circulation and commercialization of their works in digital ecosystems. At the same time, blockchain does not eliminate core legal challenges related to copyright enforcement because technological verification cannot independently determine authorship legitimacy, ownership validity, or the lawful transfer of intellectual property rights. Several limitations continue to undermine effective protection, including unauthorized minting, copyright infringement across jurisdictions, anonymous blockchain identities, and the absence of standardized licensing frameworks in NFT marketplaces. The interaction between decentralized technological governance and territorially bounded legal systems therefore remains one of the most critical issues affecting the development of NFT-based creative economies. Existing legal institutions often struggle to respond to disputes that emerge within borderless blockchain networks. Effective copyright protection consequently requires not only technological solutions but also adaptive legal mechanisms capable of addressing emerging digital realities.

The analysis also highlights the existence of a substantial regulatory gap within Indonesia's legal framework concerning NFTs and blockchain-based digital assets. Current regulations governing copyright, electronic transactions, and crypto-assets provide fragmented protection and do not adequately address the unique characteristics of NFT transactions. Greater legal certainty requires the development of a comprehensive regulatory framework that explicitly distinguishes token ownership from copyright ownership, establishes legally recognized digital licensing mechanisms, and strengthens enforcement procedures for NFT-related disputes. Regulatory reform should also encourage institutional coordination among intellectual property authorities, digital governance agencies, and financial regulators to ensure consistent protection across digital markets. By integrating technological innovation with coherent legal safeguards, Indonesia can create a more predictable environment for creators, investors, and digital consumers while supporting the long-term sustainability of blockchain-based creative industries. Future policy development should also incorporate comparative lessons from jurisdictions that have begun addressing NFT-related legal issues through specialized regulatory approaches. Such efforts would contribute to the establishment of a balanced governance model that promotes innovation while preserving the fundamental principles of copyright protection in the digital era.

REFERENCES

Ajakaye, O., & Lawal, A. (2025). Digital Justice and IP Protection: A Transatlantic Approach to Regulating NFTs, Blockchain and Copyright Infringement. *Engineering and Technology Journal*, *10*(9). 10.47191/etj/v10i09.15, I.F. – 8.482

Aziz, A. A. (2022). Pembangunan hukum nasional menghadapi non-fungible tokens dalam revolusi digital. *Lex Renaissance*, *7*(2), 358-371. https://doi.org/10.20885/JLR.vol7.iss2.art10

Chohan, U. W. (2024). Non-fungible tokens: Blockchains, scarcity, and value. In *Non-fungible tokens* (pp. 1-11). Routledge. https://www.taylorfrancis.com/chapters/edit/10.4324/9781003435518-1/non-fungible-tokens-usman-chohan

Darmawan, B., & Sardjono, A. (2023). Analisis Yuridis Terkait Perlindungan Hak Kekayaan Intelektual Dalam Hak Cipta Oleh Penyelenggara Marketplace Token NFT. *Technology and Economics Law Journal*, *2*(2), 5. https://doi.org/10.21143/TELJ.vol2.no2.1045

Durham, Joshua, Regulatory Sandboxes Enable Pragmatic Blockchain Regulation (16 Januari 2023). Joshua Durham, REGULATORY SANDBOXES ENABLE PRAGMATIC BLOCKCHAIN REGULATION, 18 WASH. JL TECH. & ARTS (2023). , Tersedia di SSRN: https://ssrn.com/abstract=4342821

Dzaky, M. A. T., & Edrisy, I. F. (2025). Strategi pencegahan kejahatan siber di Indonesia: Sinergi antara UU ITE dan kebijakan keamanan digital. *PESHUM: Jurnal Pendidikan, Sosial Dan Humaniora*, *4*(2), 3614-3625. https://doi.org/10.56799/peshum.v4i2.8311

Edbert, M., Simanjuntak, Y. N., & Ardyo, B. (2024). Perlindungan Hak Pencipta Karya yang Dijadikan NFT Berbasis Sistem Blockchain Berdasarkan Undang-Undang Hak Cipta. *Syntax Idea*, *6*(6), 2817-2832. https://doi.org/10.46799/syntax-idea.v6i6.3912

Gidete, B. B., Amirulloh, M., & Ramli, T. S. (2022). Pelindungan Hukum atas Pelanggaran Hak Cipta pada Karya Seni yang dijadikan Karya Non Fungible Token (NFT) pada Era Ekonomi Digital. *Jurnal Fundamental Justice*, 1-18. https://doi.org/10.30812/fundamental.v3i1.1736

Hapsari, R. A., Aprinisa, A., & Putri, R. A. (2023). Perlindungan Hukum terhadap Teknologi Non-Fungible Token (NFT) sebagai Identitas Karya Intelektual. *Amsir Law Journal*, *4*(2), 236-245. https://doi.org/10.36746/alj.v4i2.189

Hariri, M. R., Ramli, A. M., & Ramli, T. S. (2023). Tinjauan Hukum Praktik Komersialisasi Lagu dan/atau Musik Melalui Non-Fungible Token (NFT) Oleh Para Musisi di Indonesia. *COMSERVA: Jurnal Penelitian Dan Pengabdian Masyarakat*, *2*(11), 2645-2657. https://doi.org/10.59141/comserva.v2i11.665

Khausan, M., & Taufik, M. (2025). Copyright Protection in the NFT Ecosystem: Legal Challenges and Policy Recommendations for Indonesia. *Hakim: Jurnal Ilmu Hukum dan Sosial*, *3*(1), 1052-1071. https://doi.org/10.51903/hakim.v3i1.2299

Kim, H. Y. (2025, July). A Study on Integrated Framework for Copyright Protection Based on Multi-signature in NFT. In *World Congress in Computer Science, Computer Engineering & Applied Computing* (pp. 346-354). Cham: Springer Nature Switzerland. https://doi.org/10.1007/978-3-032-22208-4_23

Kim, H. Y. (2025, December). A Multilayered Blockchain Security Framework for Copyright Protection of NFT-Based Digital Content. In *International Conference on Complex Networks and Their Applications* (pp. 310-317). Cham: Springer Nature Switzerland. https://doi.org/10.1007/978-3-032-16719-4_25

Laser, C. J. (2024). Legal Issues in Blockchain, Cryptocurrency, and Non-Fungible Tokens (NFTs). *Nebraska Law Review*, *102*(4), 761. https://digitalcommons.unl.edu/nlr/vol102/iss4/3/

Mayana, R. F., Santika, T., Pratama, M. A., & Wulandari, A. (2022). Intellectual Property Development & Komersialisasi Non-Fungible Token (Nft): Peluang, Tantangan Dan Problematika Hukum Dalam Praktik. *ACTA DIURNAL Jurnal Ilmu Hukum Kenotariatan*, *5*(2), 202-220. https://doi.org/10.23920/acta.v5i2.812

Pakaya, F. (2025). Legalitas NFT (Non-Fungible Token) dalam Sengketa Hak Kekayaan Intelektual di Indonesia. *Al-Zayn: Jurnal Ilmu Sosial & Hukum*, *3*(3), 3106-3115. https://doi.org/10.61104/alz.v3i3.1723

Putra, M. D., Setiawan, P. A. H., & Rae, G. N. T. (2025). Tinjauan Perlindungan Hukum terhadap Inovasi Teknologi Digital dalam Kerangka Hak Paten di Indonesia yang Berkepastian Hukum. *Jurnal Hukum Lex Generalis*, *6*(4). https://rewangrencang.com/ojs/index.php/JHLG/article/view/2113

Saroh, S., Achmad, L. I., Hamdan'Ainulyaqin, M., & Edy, S. (2023). Analisis Transaksi Digital Non Fungible Token (Nft), Sebagai Instrumen Investasi Dan Jual Beli Aset Virtual Menurut Perspektif Ekonomi Islam (Studi Transaksi Digital Virtual Asset NFT pada Platform OpenSea. io). *Jurnal Ilmiah Ekonomi Islam*, *9*(1), 378-386. https://doi.org/10.29040/jiei.v9i1.7948

Tan, C. (2024). Rights in NFTS and the flourishing of NFT marketplaces. *International Journal of Law and Information Technology*, *32*(1), eaae018. https://doi.org/10.1093/ijlit/eaae018

Zipan, Z., Lubis, E., & Fauziah, F. (2022). Analisis Yuridis Transaksi Non-Fungible Token (NFT) Ditinjau Dari Undang-Undang Hak Cipta. *Jurnal Hukum Jurisdictie*, *4*(2), 12-31. https://doi.org/10.34005/jhj.v4i2.146