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LEGAL PROTECTION FOR THE DIGITAL COPYRIGHT INFRINGEMENT ON DECENTRALIZED BLOCKCHAIN TECHNOLOGY: CRITICAL ANALYSIS

Anosha
Lecture Law.
Email anosha.wahab@szabul.edu.pk
Asadullah Almani
Lecture Law.
Email asadullah.almani@szabul.edu.pk
Amna Jan
Assistant professor.
Email: amna.jan@szabul.edu.pk

Abstract
Decentralization and distributed storage capabilities of blockchain technology are important features of the technology which are relevant in many applications to intellectual property (IP) rights. The current advancements in network technology have made it easier to release digital works online. The suggested system will apply blockchain technology to take advantage of its tamperproof, distributed, and traceable features. Using smart contracts, the system is able to control the whole lifecycle of a digital copyright. The results of the test suggest that this system provides high-level protection of digital copyrights and is effective in terms of verifying ownership rights. Nevertheless, some difficulties such as comparatively weak protection mechanisms, lag in action, frequent violations, the complexity of rights determination, and unsatisfactory results are still present. One of the most problematic aspects of the digital world is the violation of the digital property that is a great threat to the rights of those who own the data, and to their incentives to produce original work. Urgently, there is a need to enhance the digital copyrights protection approach by applying the blockchain technology, as it spells substantial impacts on societal development. As the digital products grow quickly and the number of copyright cases increases accordingly, the sphere of digital copyright protection experiences a series of challenges, such as massive copyright infringement and inability to check and protect digital rights. In this respect, more attention should be devoted to the improvement of the mechanisms aimed at preventing and combating the cases of digital copyright infringement in blockchain settings. The current paper considers the legal enforcement modes that can be used to address the problem of digital copyright infringement in the environment of blockchain technology.

Keywords: Blockchain Technology, Digital Copyright Protection, Legal Enforcement, Intellectual Property, Decentralization

1. INTRODUCTION
The blockchain technology is characterized by a number of unique properties, such as decentralization, immutability time stamping, traceability, and the ability to execute smart contracts. Decentralization amplification principle, and smart contract performance ability. The decentral principle makes the digital ledger controlled by many nodes and, thus, increases the level of transparency and prevents the system from being influenced by anyone, censored, or manipulated. Moreover, the impossibility to change or delete the information once it is stored in the ledger ensures that a verified and long-lasting record of ownership and transactional history is maintained (Bajwa and Meem, 2022). The technology initially surfaced into the limelight with the introduction of the first known digital crypto currency known as Bit coin and has since been used to introduce the creation of the accepted digital currency and has since been used to introduce numerous other digital and virtual currencies operating under the same operational principles. There is also significant potential in the field of intellectual property (IP) with the use of blockchain not restricted to cryptocurrency. It can facilitate and

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safeguard diverse areas of IP management such as property registration, licensing, enforcement, and protection. The prospect of blockchain to carve out an automated, trustworthy and efficient system of IP protection may be viewed as a convincing reason to reduce the adverse effects of challenges that come along with its introduction, despite the social, legal, regulatory, and technological issues that it brings (Gürkaynak et al., 2018). To address this possibility, the World Intellectual Property Organization (WIPO) has formed a Blockchain Task Force and embarked on the development of a new WIPO Standard that will form one of the most comprehensive and integrated systems of intellectual property rights (Hugendubel, 2021).

Blockchain technology is commonly represented in the form of so-called smart contracts for event-driven programs, which run on a distributed, decentralized, and collectively maintained registry. These programs are the ones that regulate registration, ownership, and transfer of digital assets (Ruzakova and Grin, 2017). There are two main types of blockchain systems, namely, public and private (Buterin, 2015). A publicly accessible blockchain does not have any limit of participation or access. The system can be accessed by any person who may install the necessary software and make transactions. Members of a public blockchain have the same access privileges to the information held by it since there is no centralized administrator or preferential operator, who can modify or delete records. Bitcoin is the ideal case of such a communal blockchain. On the other hand, an enclosed and regulated system is operated by a private blockchain. The entry to such a system is restricted and controlled by an administrator who decides the right of participation and reserves the right to update the contents of the ledger. The creation of a private blockchain can be done within one organization or a group of organizations, where it can be customized to address operational or compliance needs (Savelyev, 2017).

Currently, the use of blockchain technology in the field of intellectual property (IP) has various applications. These are checking the provenance of works of creativity, auto-licensing the works with smart contracts, controlling the digital rights in music and art, and enhancing the real-time tracking of patent applications and previous art (Li and Wu, 2025; Wissen Research, 2024). Blockeai, Verisart, and Bernstein are examples of platforms that will allow blockchain to increase the degree of authenticity, the security of the licensing process, and the possibility of tracking the use in real time -which will help establish trust and operational efficiency among creators, rights holders, licensing, and regulating agencies (Debut Infotech, 2025; Abounaja, 2024). Protections against counterfeiting and unauthorized application can also be enhanced by the timestamping feature of blockchain, and, at the same time, new approaches to the monetization of intangible assets can be developed. Such developments have become a big challenge to infringers and digital pirates. However, one legal issue remains that of balancing the decentralized and irrevocable nature of blockchain technology against the current laws and methods of intellectual property protection, as well as means of dispute resolution.

Smart contracts with executable, self-enforcing code that automatically executes and enforces IP licenses constitute a large step forward in efficiency of contracts. They enable the proper payment of royalty without the involvement of middlemen (Global Law Experts, 2024). Whereas conventional systems of copyright have been unable to keep abreast with the blistering development of digital technologies, blockchain proposes a novel approach of security by distributed storage and peer-to-peer information transfer. Blockchain enhances the legal and evidentiary grounds of the enforcement of IP rights by making data objectively immutable and traceable (Luo, 2022). Besides, the immutable and decentralized recordkeeping

provided by blockchain creates a verifiable and irreversible system of copyright registration of works and the verification of their ownership (Yuanjun & Xiaoli, 2018).

This structure provides technical guarantees of validity, ease of maintenance of evidentiary files, and justification of legal claims in case of legal action. According to the commercial practice, a system like Airbnb might also consider improving its IP management with the help of blockchain that will minimize the risk of infringement, enhance transparency and simplify international transactions (IJFMR, 2025; World Economic Forum, 2020). Nevertheless, the decentralized character of blockchain resists conventional legal systems based on the territorial jurisdiction and centralized power, thus making the procedure of enforcement and dispute resolution a challenging task (IJFMR, 2025). Therefore, even though the technology has significant potential, it will have to pass through significant legal and regulatory obstacles before it can be used as a completely harmonized IP protection and enforcement platform (Bajwa & Meem, 2022).

The blockchain technology has a decentralized organization that presents immense difficulties to the implementation of traditional dispute resolution systems with no central control or intermediary to maintain the ledger or verify transactions. This lack of centralized control makes it difficult to attribute responsibility and reclaim it through the application of legal remedies. Furthermore, the existing system of legislation fails to sufficiently assure the soundness or truthfulness of blockchain entries, which raises the question of the possibility of fraudulent or inaccurate entries becoming permanently inscribed into the ledger and potentially being used as legal evidence. These problems are also worsened by the transnational and borderless character of blockchain since it prevents the successful implementation of national intellectual property laws since the technology exists outside the scope of the traditional jurisdictional framework (Sejwal & Gupta, 2025; IJFMR, 2025). One of the key problems in this respect is the problem of jurisdictional ambiguity. The fact that blockchain node act on an international scale and operate independently makes it extremely difficult to define what legal framework to apply and what the enforcement authority should be given the scenario of an online copyright violation (IJFMR, 2025). The current state of law research highlights the necessity to define and synchronize the current legal systems to have a chance to manage cases of digital intellectual property violation in the decentralized landscape that blockchain technology implies.

2. LITERATURE REVIEW

2.1 Blockchain and Intellectual Property Rights

Blockchain Technology Mechanism:

A blockchain is a decentralized technology used in digital ledgers that is intended to store transactions safely over a distributed network of computers. It is characterized by its impossibility to change or modify data or information once it is recorded. Blockchain is a peer-to-peer system, as opposed to traditional databases, which are usually controlled by a central authority and where different participants (called nodes) hold an entire and synchronized copy of the ledger. Data on the blockchain is stored in small units which are known as blocks. Each block stored a record of transactions, a time stamp, a cryptographic hash of the previous block, and a nonce-a random number generated. A cryptographic hash algorithm transforms data input into some fixed length of alphanumeric characters, which are specific to the data. Since every block uses the hash of the previous one, any change to one block would change the hash of the block and hence corrupt the whole chain and guarantee the ledger immutability. The blockchain integrity is ensured by the consensus mechanisms that authenticate and confirm

transactions. Some of the most common include Proof of Work (PoW) in which participants, referred to as miners, solve complex mathematical problems in order to verify transactions and Proof of Stake (PoS) where the participants are picked based on the amount of the cryptocurrency they hold and they are willing to put it down as a collateral. The latter technique is more energy-efficient than PoW since it reaches a consensus. Every transaction registered on blockchain chain blocks is visible to the network participants but secured by using highly sophisticated cryptographic algorithms. Although this information is open, the users are pseudonymous. Moreover, some blockchains include smart contracts, self-executing agreements that automatically execute predetermined actions upon the fulfillment of set requirements and further extend the functionality of blockchain past being purely transactional. When a block has been certified and attached to the chain, it cannot be modified and removed except through a unanimous decision of the network majority. This constancy creates a lot of dependability and trust in the system. On the one hand, every participant has a complete copy of the blockchain, which guarantees synchrony, the transparency of its functions, and the absence of single points of failure. In turn, blockchain technology provides a transparent and tamper resistant and secure records keeping with a wide range of applications, including, but not limited to, digital currencies, supply chain management, intellectual property safeguarding, and so on. The working logic of the blockchain technology is so complicated that it involves interrelated concepts that can get lost so easily when one starts to consider the legalization of copyright with the latest blockchain technology. Besides, blockchain is nothing more than a chain of blocks which are connected in some manner. Block contains information regarding all the transactions completed by users of the system (they can be buyers, sellers or any other middlemen) with an object. These blocks appear as links in a chain, where the data in one block points to the previous block, hence providing security, and arranging the transactions in time. Blockchain technology is one such technology which is highly adaptable. Therefore, it can be used to create various types of databases as it was depicted by authors in their study (Mhana et al., 2019).

A blockchain maintains records that cannot be modified in any way through the use of distributed digital ledgers. By this feature, it becomes possible that the information contained in the blocks will not have been altered or cleared and at the same time the databases are replicated many times in the network, therefore, the information will be spread among many nodes in the network. Authentication and confirmation of transactions is done by any computers that are available to participate in the network at any given time. It is this crowd sourced oversight that keeps the ledger up-to-date, and besides, it enables the elimination of the utilization of an overarching command structure. Simply put, in a public blockchain especially where a Proof of Work (PoW) consensus mechanism is in place, the chances of a successful cyberattack that could change every copy of the ledger at the same time are extremely negligible. The reason behind this is that these systems do not have a single point of failure, hence one of the participants or nodes cannot jeopardize the integrity of the entire network. As a result, it would be quite unimaginable, even virtually impossible, to make the entire blockchain unavailable or compromised by a malicious actor by a single system that was compromised (Porras, 2023).

Smart contracts are usually related to blockchain technology. They are simply computer programs. that execute tasks automatically in accordance with a predetermined condition. This kind of system operates on a common registry; and is decentralized. A network of computers serves to maintain the ledger. Smart contracts managing the transfer of assets, or relations with the blockchain (Ruzakova & Grin, 2017). Two primary types of blockchain systems exist; one

of them is public and another one is a private blockchain (Buterin, 2015). Public blockchain ones are open to all. One of the members could enroll himself by installing certain programs and making some purchases. In this type of blockchain, each and every one of them has equal accessibility to data. Most importantly; no one can ever alter information, by a centralized body in a social environment. One of the most well-known examples is definitely Bitcoin; it has true popularity. Nevertheless, the setups of private blockchain are an exclusive arrangement. They are administered by someone: such a manager then decides who a member becomes or even what a member can do to the overall network. The administrator in this case gives the reins of course, or attempts to, where necessary. It is understandable that this form of blockchain is mostly and usually used in a company and is designed to suit individual requirements of the respective groups involved (Savelyev, 2017).

The blockchain technology offers an inexpensive and secure data storage mechanism where the information once stored in the blockchain cannot be erased or changed. It is especially appropriate in the judicial and evidentiary context since, being traceable and tamper-proof, it guarantees a clear transparent record history of all the data entries and transactions. Any effort to alter or distort documented information is easily identified, thus maintaining integrity of information. The system under consideration is based on blockchain technology that stores and protects user information, transaction history, copyright data, and information on copyright conflicts. All these are stored on the VNT Chain platform that has been chosen due to its efficiency, speed, and security. In addition, the architecture of the system is supposed to be flexible, allowing us to migrate to other blockchain technologies in the case when operational or legal conditions require the given change. Such a flexible design will guarantee the further reliability and evidentiary merit of the data even in the case when VNT Chain becomes ineffective or outdated. It is capable of accommodating numerous transactions. Its processing time is fast fast; it also has strong security. These features are important to digital music copyright management. These guarantee fast, also safe, copyright transacting. Records are not subject to modification, and they are very visible. VNT Chain is also a supporter of smart contracts. These assist in automation of major procedures such as registration and music sales related procedures. This certainly helps to make the system more efficient and reliable, would you not say (Shi and Zhou, 2025).

Digital assets, which can be an artwork, video, or other content, are a type of Non-Funding Token (NFT) and a blockchain stored as a set up as a unique token. The development of these tokens represents a procedure according to which every asset receives a unique identification code based on its metadata and being encrypted by using cryptography. Although the physical version of the asset could be stored off chain, the NFT related with it is stored on an unchangeable blockchain ledger, thus ensuring its credibility, provenance, and security against unauthorized access or theft. This is a procedure commonly known as minting where the underlying asset is converted into a distinct and verifiable digital asset, which offers a secure method of determining ownership and protecting digital property (Sharma, 2025). Minting refers to the creation of the code of ownership of a digital object. The identifiers are received in the code; it defines the information on the blockchain, too. Artists sell their works on NFT markets after that; nevertheless, the markets are linked. NFT is linked to user blockchain accounts, history of transaction records, and ownership tracking. The smart contract is in charge of an NFT sale. The smart contract stores the ownership of NFTs of an individual. This agreement monitors designated information and terms; like royalty of artists. Although NFT smart contracts may be used to increase authenticity, it does not automatically provide copyright protection as well as ownership of the underlying asset (Dieli, 2020).

Characteristics of Blockchain Technology:

Blockchain technology has emerged as a robust mechanism for enhancing digital copyright enforcement. Its suitability stems from several key characteristics:

Decentralization: Blockchain creates a distributed network, ensuring that no single organization controls the data. This removes the unauthorized alterations or uncertainty of tampering by a central authority.

Immutability: Once recorded, blockchain data cannot be changed or removed, providing a tamper-proof data of ownership and copyright that can be independently justified.

Transparency: Transactions and records on a public blockchain are visible to all participants, facilitating verification of ownership and rights that fostering trust among creators, consumers, and regulators by

Traceability*:* The history of a digital asset-including its creation, modifications, and transfers-can be tracked, allowing rights holders to identify unauthorized use.

Smart Contracts: Self-executing contracts coded directly into the blockchain can automate licensing and payment processes; safeguarding royalties are properly given when a work is utilized.

Ownership and Provenance: Blockchain can furnish definitive evidence of ownership for digital assets, often constituted through NFTs; securing rights are verifiable and unique.

Access Control: Creators can explain usage rights, determining who may use, access or distribute their works.

Security: Blockchain employs cryptographic techniques to secure information, reducing challenges of unauthorized manipulation or access.

Cross-Border Transactions: Operating globally, blockchain facilitates cross-jurisdictional licensing agreements and simplifies international copyright enforcement

Cost Efficiency: Blockchain could lower costs related to transactional processes and copyright enforcement by eliminating intermediaries (like legal services and copyright registries).

Collaborative Approach: Many blockchain systems are governed to have a say in how platform rules are established and enforced by their communities, allowing stakeholders (like creators and consumers) (Qazi & Kamalovich, 2025; WIPO, 2025).

The geographical chain of technology allows saving information on record to all data blocks in a fragmented form with peer-to-peer transfer, transmission, real-time information recording, and common agreement. The recording, dissemination, or confirmation of information is indulged by each participant, and each block of data participants will account that the total loss of data and alteration or injury of a block of data will not influence the integrity of other blocks of data. Everything stored in the blockchain is trans-parent, open and cannot be transferred and a party with knowledge on block key and location can retrieve the entire information in the data block. Any malicious change, which is not caused by the value of trading or data sharing, of the data of a block with, in such a case, the tampering, will not be validated and recorded by other data blocks. The rest of the blocks continue to take note of the information and are then maliciously transformed with, rendering malicious interference meaningless and unknown to a single node. Although theoretically more than 50% of the blocks can be changed with at the same time, in practice, the data blocks are spread infinitely and new block was generated very fast, which makes it unlikely to access more than 50% of the blocks at the same time with the current computer storage and computing technology. As such, blockchain will be established after the registration information and the transaction records of the digital copyright, and the authenticity of the information recorded can be anticipated (Luo.2022).

Relationship between Blockchain and Digital Intellectual Property:

According to the WIPO Committee on WIPO Standards Committee, the Member States of the World Intellectual Property Organization (WIPO) created a Blockchain Task Force within the Committee on WIPO Standards (CWS). The work of this Task Force will involve the creation of a new WIPO standard that will contribute to the incorporation of blockchain technology into the intellectual property (IP) systems. This project aims to enhance interoperability across systems, fair treatment and legal adherence, and give the necessary cases of the lawful use of blockchain in IP management. Blockchain is a new technological advance that is redefining business practices and changing various fields of creativity and innovation. Its introduction into the intellectual property system is a major step toward digitalizing the rights management and protection in the digital age (WIPO, 2025).

The blockchain can help in simplifying the process of exchange of data in a way that ensures it is more trustworthy and reliable since it offers a continuous, electronic repository of ownership, which adds to the existing strategies of protecting intellectual property. An institution that functions in a single country can be benefited to apply blockchain to IP processes especially when the supply chains are long; multiple sites, and multiple types of regulations are involved. This is so especially in the international business where reliability in information sharing is highly important (Wagner.et.al.2025). Blockchain helps to curb fraudulence and misinformation in the IP transaction through the establishment of a clear and immutable history of IP ownership. Furthermore, the smart contracts can also help enforce the IP rights automatically, thus, protection is increased. Besides protecting intellectual property rights, blockchain technology helps increase the transparency of copyright ownership and the records of transactions, which allows creators to obtain fair compensation of their works and significantly helps to prevent the occurrence of digital piracy (Qazi & Kamalovich, 2025).

The blockchain technology is seen as a new approach towards the safeguarding of intellectual property through the attributes of a decentralized document, thus providing safeguarded recording of registrations, transactions and deposits that relate to the assets of intellectual properties. However, analysis of existing blockchain-based intellectual property projects shows that the existing systems tend to be limited to two objects of considerable concern. First, most blockchain traceability systems use basic hash upload procedures and do not describe data sources formally, which may be hard to demonstrate information integrity in judicial processes. In the traditional sense, the vast majority of systems are based on one organization to sign and authenticate transactions, which creates a problem of trust in global transactions (Wang et al., 2025). This model can be compared to electronic bookkeeping where banks monitor any changes to personal financial information so as to stop any unauthorized changes to this information, an activity that is typical of centralized institutions. Conversely, blockchain has some characteristics that include tamper-evident records, timestamps, and traceability, which reduce the necessity of having a single controlling entity. Every change in the data is checked by a specific system and is broadcasted to all the networked devices such that each device has a document of the entire operation and could track data changes in real time. Once the data is stored, they become objective and permanent and accessible to everyone concerned. It enables individuals to share information and share value without putting their lives at risk, even without a central authority (Luo, 2022).

2.2 Blockchain and Digital Copyright Protection:

Digital Copyright Mechanism:

The protection of copyrights implies the use of blockchain technology to meet certain goals, which can include changing the pre-existing program code or creating new codes. Any

computer program produced as software designed to be used in a blockchain project, regardless of its inclusion in a larger system or as the code of a smart contract, falls under copyright law (Savelyev, 2017). The copyright holder can submit his or her work in a blockchain platform during the inception of work. Blockchain is decentralized and thus simplifies the process of verification and the time and costs incurred. The date and information of the work are recorded on the timestamp feature, which assists in securing ownership rights. The property of blockchain that cannot be changed is a guarantee that the integrity of the work and evidence will remain valid in case of infringement. The traceability part monitors all the activities in such a way that it is easy to monitor and record the process in case of an infringement. The fact that smart contracts are automatically used in the execution of transactions also guarantees that transactions are being made without interference by humans as it is through this that the seller is able to receive the digital contents right after paying without the buyer having to accept the terms manually. This will reduce the possibility of disputes due to the unequal interpretation of contractual terms. Smart contracts execute themselves, and it serves as a guarantee to ensure that the transaction is fully automated (Luo, 2022).

After the copyright owner authenticates the information with the Elliptic Curve Digital Signature Algorithm (ECDSA), the copyright data and signature are encrypted under the elliptic curve of cryptography (ECC) mechanism. The encrypted data along with the image hash are then uploaded to the blockchain, which can first cause confusion or frustration among the users. An intelligent contract then verifies the owner of the copyright. The hash values are used to detect misuse of the digital asset due to its similarity. The image has turned into the MD5 key and allows further encryption of the asset. The encrypted image and file are uploaded to Interplanetary File System (IPFS) and the address of the storage is noted on the blockchain. Such encrypted files can be accessed by the user upon verification and paying, an option that is supported by a dual-smart art contract system, which is a copyright transaction system. According to empirical findings, this process does not only confirm the existence of copyrights but also encrypts the image and relevant copyright information twice to prevent improper usage or a sale to the offenders and provides a higher level of protection to the image copyright system as a whole (Zhang et al.,2024).

Implementing blockchain technology and digital rights registration, copyright information is registered in blocks connected by hash pointers to the previous block, and thus they cannot be modified. The blockchain systems are used to protect registration, storage, authentication, authorization, allocation of digital rights through consensus protocols, asymmetric cryptography, and smart contracts to provide the security and integrity of digital content (Ding et al., 2019). Blockchain enables the appearance of the status of a copyright item and dispensation of permissions, and this means that users all over the globe can get information about ownership and authorization to use it. The viewing and usage of authors of their work can be easily tracked, and the decentralized ledger greatly eases the procedure of granting authorship to an individual in comparison to the common registration mechanisms. As such, blockchain is mainly used to deliver and certify legitimate ownership of a piece of work by its author or rights owner (Kirsanov & Popovich, 2020).

By connecting blockchain technology with the registration of digital rights, copyright information is stored in blocks, and each of them is connected to the block in the form of a hash pointer to the hash value of the prior block. This is an assurance that the digital copyright information is not altered as long as it is stored. The blockchain system has been implemented using processes like consensus protocols, asymmetric cryptography, and smart contracts to enforce the information security and integrity in registration, storage, authentication,

authorization, and allocation of the digital rights. This helps significantly in securing digital content (Ding et al, 2019). Blockchain maintains the information on the status of the copyright object, and the boundary of the allowable use permits every user all over the world to access all data about the piece of work and the rights of ownership to the information they have. Using blockchain, authors may merely examine the users that watched their work, when, and how. Also, can easily keep track of who, when and how another person utilized his work. Storing a work in a decentralized repository (blockchain) makes the work attribution process significantly easier than traditional methods of depositing a work. In such a way, the main role of blockchain in copyright protection is to offer and confirm the legitimate ownership of a work by the author or other rights holders (Kirsanov and Popovich, 2020).

Digital Copyright Protection under Blockchain Technology:

Copyright laws are significant to the creators since they allow them to have control over the usage of their creative products and avoid illegal replication and distribution. Nonetheless, the existing copyright regime is prone to many issues on the digital platform today, and it is hard to claim ownership of rights by a small creator. The ability of the internet to spread information worldwide within a few seconds is one of the greatest problems as it makes piracy and unlawful distribution very convenient. The peer-to-peer networks and pirate sites enable users to use the works of other authors without paying the authors. Whereas big corporations are capable of fighting piracy, lone artists, authors and musicians might not have resources to fight their rights. These are some of the issues that blockchain technology can potentially address with regard to the copyrights of creators (Singh, 2024). The systems involving blockchain offer open and secure channels of transfer of ownership of copyrights. With the copyright data on the blockchain, creators can protect their data and ensure that no modifications or manipulations of it occur, which means that they can confirm the ownership in a secure way. Licensing and payment can also be carried out in such systems in an easy way. The process of simplifying royalty payments and licensing deals makes creators invest their efforts in making new content instead of paperwork. The creators can also easily access the information on their copyright at any time, in any device, using blockchain technology (Sumner, 2024).

Intellectual property rights protection is being carried out in blockchain-based projects all around the world. An example is that the European Union Intellectual Property Office (EUIPO) has devised initiatives to store trademarks and design information in blockchain networks. This has improved the transparency of the intellectual property database and made it easier to monitor alterations in ownership and identify fake goods. Similarly, digital artists and creators can register their product on blockchain platforms on the same sites as Ascribe and Mediachain, where smart contracts are deployed to license and pay royalties. These efforts have been found to reduce administrative burden and offer solutions based on conventional intellectual property management (Sonisvision.2025). According to Niu et al. (2021), the mechanisms of blockchains ensure and protect the copyrights of music and transactions, overcome obstacles, time wastage, and inefficiencies that come with the traditional management of copyrights. Liu et al. (2021) suggested a blockchain system of certifying audio copyright by allowing undisputed recording of an audio work on an unalterable blockchain and without relying on copyright authorities. Chen et al. (2019) proposed a blockchain system of copyrights of audio and video in the form of an alliance with the use of Practical Byzantine Fault Tolerance (PBFT) algorithm to guarantee improved efficiency. This system helps to avert unauthorized modification or gushing of the copyright data, and it employs cryptographic methods to improve trustworthiness and traceability in the copyright authentication. The introduction of short videos with a duration between several seconds and few minutes created

mainly using a mobile device has led to quick sharing, editing, and interacting with various platforms. There have been many cases of copyright violation in local short video sites pointing to inefficiency of the current copyright protection measures. Therefore, blockchain technology has received significant interest as a mechanism of protecting copyright on short videos (Bin et al., 2023).

3. RESEARCH METHEDOLOGY:

The study is qualitative research to explore the issues and the possible benefits of adopting blockchains technology and copyright laws in the legal system. Primary data will be obtained based on an extensive literature review covering the existing knowledge on the use of blockchain in law. The paper outlines trends associated with regulation issues and legal aspects of using blockchain alongside copyright law. Moreover, practical experience represented by case studies of the regions that deployed blockchain in their legal frameworks can be used, such as in the context of digital identity management and reducing the infringement of copyrights. The study discusses the application of legal principles to the management of digital copyright issues based on the synthesis of the literature review, case study, and expert opinions, providing a broad insight into the legal environment of blockchain-based copyright protection.

3.1 Legal Framework:

According to the U.S copyright law, the creator of a work has exclusive rights to reproduce the work, produce a derivative work, sell or transfer ownership of copies, and openly perform or showcase the work. These rights can be given to another party. Historically, the author of a digital form is considered the owner of the copyright of that work. But in the case of NFTs, copyright is the property of the owner at the time of minting, even when the NFT represents existing artworks. So, the minter of the NFT is considered to be the owner of the copyright.

For Example: **Miramax v. Tarantino,** the federal court was the first to accept NFT-related copyright claims, presented by Tarantino. Miramax claimed that Quentin Tarantino had infringed copyright by nuancing NFTs using scenes and pieces of the Pulp Fiction script even after transferring all rights to the film, including intellectual property, to Miramax in 1993. Tarantino believed that the NFTs were a reserved right in the original agreement, and Miramax claimed that the sale of NFTs was a single operation, which did not fall under the reserved right (Dieli, 2020).

Shenzhen Qice v. Bigverse The first NFT copyright case to be adjudicated by a Chinese court in the country was done by Bigverse. The controversy was a cartoon of the series of Fat Tiger that was published on Weibo. A plaintiff Shenzhen Qice Diechu Cultural Creativity Co., Ltd. alleged the infringement of the copyrighted image by Hangzhou Yuanyuzhou Technology Co., Ltd., the operator of the NFT platform, because a user minted and sold an NFT of the image with the watermark of the artist (Allen and Overy, 2022).

The Pakistani legal system of digital copyright is dominated by the Copyright Ordinance of 1962, which defines the basic provision of protection to the copyright owners. The Digital Rights Management (DRM) system is an extension of this law which uses technology to protect the rights of creators on the internet. The Electronic Transactions Ordinance of 2002 also adds to the security of the digital transactions and in the process safeguard copyrighting by making users more confident in the digital services. Pakistan is not an exception regarding international accords, including the Berne Convention of the Protection of Literary and Artistic Works (GGLS, 2024).

The protection against unauthorized duplication and dissemination of copyright, such as infringement of NFTs, is granted by the Copyright Act of 1957 in India. The copyright law in Australia is the Copyright Act 1968, according to which it is possible to investigate the possible

occurrence of the infringement of digital assets, yet there are no court decisions related to NFTs so far. Australian regulators are exploring the use of more expansive regulatory frameworks on crypto-assets, and NFT markets may face the same responsibilities as traditional websites. NFTs and smart contracts are becoming known the world over as tools that help to provide automatic payments in the form of royalties and management of rights of artists (Garg, 2025).

Ownership in Decentralized Network:

Under decentralized networks, ownership is linked to control of the keys of digital assets, which are the access keys to digital assets. a distinctive cryptographic address is associated with every asset, and owns the corresponding private key fully formed ownership. The blockchain offers a transparent and unchanging record of all transactions, and anyone on the network can check the history of the ownership of the assets. The transactions are authenticated by networks through consensus mechanisms so that the claims of ownership are correct and cannot be retroactively altered. Consequently, ownership in decentralized systems is largely demonstrated by possession of a private key (Eldridge, 2025).

Digital Ownership Legally Transferred:

Non-Fungible Tokens (NFTs) revolve around the idea of digital ownership. Legally, it is important to distinguish the ownership of the NFT itself legally without the ownership of the intellectual property of the digital content, i.e. of the images or videos. Generally, the owner with ownership of the token and its metadata is provided by buying an NFT, however, without acquiring any copyright or intellectual property rights. This is similar to purchase of a physical painting: possession of the canvas does not in any way provide the copyright of the same unless there is a contract agreement. Eurojust opines that copyright law is usually retained by the creator unless otherwise, and as such NFT purchasers do not automatically gain control over the rights to the related content (Garg, 2025).

Jurisdiction and applicable law:

D'Alessandro (2024) emphasizes that the copyright law is territorial in nature, in most cases, and is incompatible with the blockchain of transnational and decentralized nature of how it operates. The ability to distribute blockchain nodes in more than one country makes it difficult to determine the location of an infringement, making the identification of the applicable law difficult, as well as the assignment of jurisdiction. Current methods of dealing with copyright violation on the Internet are usually based on:

1. where the defendant uploads its content,
2. the place of access to the content, or
3. the place where the infringing content was aimed at.

The use of these approaches differs depending on jurisdiction and should be case-by-case considered. In the case of blockchain, an accessibility-based strategy can prove to be more adequately applicable since the approach can be used to localize infringements, even though the structure is decentralized. Since the content of blockchain is theoretically available on a global scale, any breach may arguably take place in many jurisdictions at once. This brings about other legal issues, including language differences, currency, and domain names that might not be in tandem with the digital and global nature of blockchain.

4.1 ANALYSIS AND DISCUSSION

4.1 Legal Application for Digital Copyright Infringement: Blockchain Technology

The legal frameworks that were established to regulate copyright in the digital era are the Copyright Digital Millennium Copyright Act (DMCA) of 1976, and the Berne Convention.

According to the copyright legislation of the United States, the Copyright Act of the year 1976 creates the foundation of the copyright law in the country, which provides the authors and creators of any original work with the rights over it. The DMCA was signed in the year 1998 and it is concerned with copyright in the digital space as well as it seeks to protect online suppliers of services. The Berne Convention, an international copyright protection convention, stipulates that copyright protection must have minimum standards or standards to be recognized, and therefore there must be no need to register for the work. Moreover, digital rights management (DRM) technologies based on blockchain are coming up to monitor the use of content and provide fair remunerations to creators. The models of community governance also empower the users to report and deal with copyright infringements to build collective power in copyright enforcement and management during the digital age (Eldridge, 2025).

Smart contracts are commonly used in blockchain technology to run event-based programs on a decentralized and distributed registry, managing assets and asset transfers (Ruzakova and Grin, 2017). There are two main types of blockchain networks: public and private (Buterin, 2015). Public blockchains use an open system: any person can access it using the relevant software and can perform operations, and everyone has equal access to the information on the network. A good example of a publicly used blockchain is Bitcoin. On the contrary, private blockchains are closed networks that are operated by an administrator who manages access and approves changes. This is because organizations or consortia can adopt private blockchains in accordance with the operational needs of their organization (Savelyev, 2017).

Although blockchain assures greater transparency and security in various industries, it also has considerable copyright issues. The production and sale of Non-Fungible Tokens (NFTs) unique digital assets that can signify ownership or authenticity can give rise to copyright infringement, especially when the creators have not given their permission to have their work used. With the continuous growth of the web and the metaverse which are entirely dependent on blockchain and chain, the possibilities of copyright infringement increase. This conflict is due to the inability to change, decentralize, and the pseudonymous character of NFTs and blockchain networks (D'Alessandro, 2024). In a landmark court case, a judge ruled that the sale of NFT is a reproduction event, making it a one-time re thus the sale of Tarantino NFTs was a breach of the copyright. A victory on the side of Miramax would underscore the idea that copyright safeguards apply to the assets, which NFTs represent, and not the act of minting them (copyr Creators and buyers should ensure that they comprehensively study NFT transactions before carelessly infringing the copyright laws (Delie, 2020).

The concept of blockchain provides an alternative way of ensuring the security of intellectual property by using decentralized records to register, record, and deposit IP safely. Nonetheless, there are significant limitations of existing IP systems based on blockchain. In most systems, simple hash uploads are used, and the data provenance is not formally registered, making it more difficult to verify information integrity in a legal environment. Also, the majority of systems rely on a single organization to sign and verify the transactions, which creates a new problem of trust in international exchanges (Wang et al., 2025). This architecture is similar to electronic bookkeeping, where the traditional systems are based on central automated institutions, e.g. banks, to monitor the changes and avoid illegal alteration of individual records. Blockchain, however, possesses such characteristics as tamper-evident records, date and traceability potential. Every change in data is verified by an existing system and broadcasted to the entire devices attached to it and as such every device has a record of the entire process and can keep track of the changes in data in real time. Once data are stored, they become stored in an objective and non-revocable position and can be accessed by all participants. This enables

individuals to share information and value safely even without the presence of a central authority (Luo, 2022).

On April 20, 2022, the Hangzhou Internet Court made a groundbreaking decision in an NFT-based copyright case. The court stated that the Copyright Law of China is applicable to NFT transactions, and that the accused violated the right of the plaintiff. The defendant was to burn the infringing NFT, i.e. send to an inaccessible location, and pay the plaintiff the damages and legal costs of RMB 4,000 (which is about USD 600) as part of the judgment. The case elucidates the copyright risks experienced by the NFT platforms in China and emphasizes the responsibility. NFT marketplaces are internet service providers the responsibility of which is to confirm IP ownership of content in their systems. The court underlined that the operators should have verbal assessments of possible copyright infringement in advance, even in the absence of the notices of the right owners, and liaise with the corresponding authorities when it is essential. This case is the first court ruling on NFT copyright infringement in China and contains essential clues on how copyright law applies to this new type of digital asset (Allen and Ovary, 2022).

In January 2021, at Ontier LLP in London, the legal team of Dr. Craig S. Wright notified five other parties by way of copyright infringement notices. These organizations were placing the Bitcoin white paper of 2008 on their websites. The letters of notification are similar to cease-and-desist letters that had cautioned the recipients that they may face legal measures should they fail to eliminate the infringing activities. Dr. It is claimed that Wright had requested the white paper to be removed on these web pages. The dispute concerns the control and the work of such fields as bitcoin.org, bitcoin.com, and bitcoincore.org that offer Bitcoin-related services (e.g., BTC). The release of the 2008 white paper is quite evidence of services which adhere to other orders. Two of the organizations responded to the notice by taking the white paper off their platforms (Porras, 2023).

The Indian creative business sector is about to pour in blockchain technology in its digitally transforming legal framework of Intellectual Property (IP) protection. First on the list was the NITI Aayog which had pilot projects suggesting the use of blockchain as a solution to corruption and bureaucracy in land records and patent management. Although India does not have special legislation on blockchain yet, it does have draft bills and advisory reports which contain discussions on the Cryptocurrency and Regulation of Official Digital Currency Bill indicating that legislators are in the process of incorporating blockchain into the legal framework. This is important in recognition and implementation of digital copyright registrations that comply with the Copyright Act of 1957 plus the Indian Patent Act of 1970. The recent legal discussion has disclosed that the courts are increasingly susceptible to accepting blockchain records as valid evidence (Sonisvision, 2025).

5. CONCLUSION:

The use of blockchain technology is a disruptive tool in the protection of digital copyright, which can improve the safety of intellectual property online. The main features of it are decentralization, transparency, and immutability enabling stakeholders to monitor, prove and execute ownership and usage of ownership and usage of digital contents. Licensing agreements and royalty payments can be automated with smart contracts and prevent a conflict and allow creators to receive their rightful due. The immutability of blockchain, however, makes it difficult to establish ownership and enforce it. Lack of transparency in content provenance might result in wrangles, and smart contracts, despite being useful, do not necessarily solve the copyright issue. The decentralized design also makes it difficult to identify infringers, and courts have to apply the current copyright laws in this new situation. The management of

copyright on blockchain depends on the proper records of ownership, open smart contracts, and digital rights management systems. Such practices facilitate licensing, monitoring usage, and giving evidence of ownership by immutable records. However, copyright regulations also exist, and its implementation can be challenging due to jurisdiction issues between nations. The ownership may be transferred through the agreements or smart contracts, and each digital asset is connected to a unique blockchain address of the rights owner. Licensing models specify conditions of use, which guarantees the ability to comply with the intellectual property law and at the same time be able to innovate with the open-source license that permits modifications but not losing rights to the creator. Nonetheless, in this case, there are rather numerous issues which obstruct the effective implementation of a blockchain-based system of copyright protection. To establish blockchain as a credible solution to the problem of counterfeiting digital copyright, the collaboration of the following individuals is necessary: technologists, lawyers, and developers of content, as well as policymakers. This cross-functional team will be able to collaborate during the development of the standards and the best practices, therefore ensuring that the benefits of blockchain are maximized in the copyright sector. Besides the protection of the right of individual creators, the technology once it becomes refined, can, therefore, not only foster innovation and creativity in digital platforms, but also add to the cultural and economic facet of our society, thus, further enriching the latter.

5.1 Limitation:

Applying copyright to blockchain has several issues. This decentralized nature makes it hard to identify copyright owners because conventional laws are based on centralized authorities to implement them. The fact that blockchain documentation is immutable to alteration makes it challenging to delete infringing assets in time, whereas the pseudonymous aspect of transactions causes anonymity of users, or makes it challenging to press charges. Also, blockchain has a global nature, which creates a problem of jurisdiction because different countries have varying laws on copyright, thus its enforcement varies. The legal structures that are in place tend to lag behind in the latest technology, and the un-standardization of the platforms also obstructs success in protection. Numerous enforcement activities also demand high resources, which may restrain their effectiveness. Together, those complicate the enforcement of copyright in blockchain settings and make it unpredictable and thus sometimes prevent creators of content from exchanging their work. This issue of scalability, interoperability among the various blockchain networks, and legal frameworks are issues that need attention before we can be confident that such a solution is feasible. Moreover, the problem of user privacy has been also brought up, and the misuse of data. The current copyright regulations simply fail to provide the legal action to digital copyright in the context of the peculiarities of blockchain technology, which causes certain problems with enforcement, Various jurisdictions may interpret and apply these laws differently, which creates a plethora of inconsistencies. Transactions using blockchain can either be anonymous or pseudonymous, and this makes it difficult to identify the identity of the person who violates copyrights. Therefore, in regard to suing the perpetrators of the same, it becomes a tricky matter in no time. The entire technical aspect of blockchain has the potential to be a significant barrier in the interpretation and implementation of copyright concerns. Many stakeholders (both creators and consumers) may lack the technical expertise of how to cope with this terrain and understand what it entails to copyright. The process of enforcing copyright on a blockchain has no standard form and is different across systems, or even technologies and jurisdictions. This inconsistency may actually cause confusion and become less effective in terms of

enforcement. The systems that we may establish to copyright blockchain may end up exerting excessive limitations to the manner in which individuals may use the copyrighted content. That would be very suppressive to creativity and innovation. Digital copyright of blockchain is enforced using expensive, particularly in case of individual creators or small businesses, measures of litigation cover, technical audits, and potential litigation in this case. Another complexity added to enforcing legal judgments is the copyright issues that arise out of blockchain transactions as well as the decentralized character of blockchain.

5.2 Recommendation:

Organizations ought to be proactive and systematic in order to comply with copyright. It is necessary to conduct regular audits of all content and digital assets to identify the bits of copyrightable information and determine possible risks. The use of copyrighted material should be regulated by giving clear policies on what may or may not be used, attributing, and guiding the usage of the third-party materials. Education and training of employees on copyright laws is essential because it gives the personnel a chance to identify possible infringement of copyrights. Also, the copyright management tools may be used to simplify the process of monitoring and managing licenses and send notices of the renewal and usage restrictions. The ownership of the digital assets is essential, and smart contracts can be used to license an agreement and regulate the terms in an automated manner. Good record keeping of rights helps in proving legal claims and resolving disputes. These measures and frequent audits of blockchain entries will allow organizations to reduce the risks of infringements, as well as protect the rights of creators.

Digital copyright infringement may be challenging particularly when there is a local copyright law, and different jurisdictions are involved. The following are some suggestions to implement in legal enforcement:

- *Determine the Infringement:* To obtain evidence in copyright infringement cases, it is important to take a screenshot, URL, timestamp, and any other pertinent information that proves to show that you have used your material illegally. Send an official cease and desist letter to the offender. In this letter, the infringement, your rights as the copyright holder and your demands (removal of the infringing material) should be clearly stated.
- *DMCA Takedown Notice:* In case the infringement is done in the site that is in compliance with the Digital Millennium Copyright Act (DMCA), send the DMCA takedown notice to the service provider that hosts the content being infringed. The details required in this notice are the contact details, statement of ownership, the name of the infringing material, as well as the location of the infringed material. Additionally, the statement of good faith is not authorized.
- *Legal Advice:* See a lawyer who specializes in copyright law. They are able to give advice regarding the feasibility of your case, possible solutions, and optimal measure of action depending on your case scenario. Think about negotiating with the infringer. To some extent, it is possible to settle a case without a long trial. Should the violation continue to develop, or should there be substantial damage, then one may sue the infringer as a way of protecting copyright infringement.
- *Alternative Dispute Resolution (ADR):* Inquire about mediation or arbitration as the possible quicker and cheaper method of settling disputes without the Court. Monitor and Enforce: keep a constant watch on the internet to ensure there is no unauthorized use of your work and give the necessary action. This may include the application of

technology solutions, e.g. automated monitoring tools, which may notify you about possible infringements.

- *Train Users:* Awareness of creation of copyright laws and the effects of copyright infringement could help prevent unauthorized use. Think about providing convenient information on copyright to the user. Working with other people in your sphere may reinforce your position and give more resources to enforce.

- *International Enforcement:* When the infringement has a cross-border effect, international copyright treaties and mechanisms can be utilized, including the Berne Convention. Be with law experts who know about international copyright law.

References:

Allen & Overy, (2022), The first NFT copyright infringement decision handed down in China, A&O Shearman, https://www.aoshearman.com/en/insights/the-first-nft-copyright-infringement-decision-handed-down-in-china

Bin.L, Yasin.I.A.M, Rehman.A.N.S, (2023), Exploring Blockchain-Based Applications for Digital Copyright Protection, *INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS AND SOCIAL SCIENCES*, Vol 13, Issue 8, (2023) E-ISSN: 2222-6990, DOI:10.6007/IJARBSS/v13-i8/17799

Buterin.V, (2015), On Public and Private Blockchains, Ethereum Foundation Blog, https://blog.ethereum.org/2015/08/07/on-public-and-private-blockchains

Chen, Y., Jiang, H., Jiang, P., & Lin, W. (2019). Digital copyright management mechanism for video and audio content distribution based on blockchain credit system. Radio and Television Information, 27(S01), 3.

Ding, Y., Pu, H., Liang, Y., & Wang, H. (2019). Blockchain Technology in the Registration and Protection of Digital Copyright, Springer Nature, pp 608-616, https://doi.org/10.1007/978-3-030-25128-4_75

Emily.D, (2022), Tarantino v. Miramax: The Rise of Nfts and Their Copyright Implications, Boston College Intellectual Property and Technology Forum, https://dev-bc-sites.pantheonsite.io/iptf/

Eldridge.M, (2025), Copyright Issue in Blockchain Technology: Understanding ownership, Licensing, Enforcement, Crypto Lawyers Corp, https://cryptolawyerscorp.com/copyright-issues-in-blockchain-technologyunderstanding-ownership-licensing-and-enforcement/

GGLS, (2024), Understanding Digital Copyright Standards in Pakistan: Protections, Licensing, and Enforcement, https://generisonline.com/understanding-digital-copyright-standards-in-pakistan-protections-licensing-and-enforcement/

Gürkaynak.G, Yılmaz.I, Yeşilaltay.B, Bengi.B, (2018), Intellectual property law and practice in the blockchain realm, The Computer Law and Security Review (CLSR), Vol-34, Issue 4, https://doi.org/10.1016/j.clsr.2018.05.027

Garg.M, (2025), NFTs and Copyright Law: The Collision of Digital Ownership, Smart Contracts, and the Reality of Copyright Infringement in Blockchain Based Art Markets Investigating the legal status of NFTs as a means of proving ownership, the challenges of enforcing copyright in a decentralized system, and the risks of digital fraud in blockchain-based art, Center for Study and Research in Intellectual Property Rights [CSRIPR], NUSRL, https://csriprnusrl.wordpress.com/2025/07/04/nfts-and-copyright-law-the-collision-of-digital-ownership-smart-contracts-and-the-reality-of-copyright-infringement-in-blockchain-based-art-markets-investigating-the-legal-status-of-nft/

Hugendubel.J, (2021), Blockchain Technology and Intellectual Property – A Basic Introduction, SSRN http://dx.doi.org/10.2139/ssrn.3917801

Kirsanov, A. N., & Popovich, A. A. (2020). Legal control over copyright protection using blockchain technology. International Journal of Criminology and Sociology, Vol-9, pp 895-900, DOI:10.6000/1929-4409.2020.09.91

Liu, Q. (2021). Research on Copyright Protection of Music Digital Library. Library Work and Research, (9), 6.

Luo.L, (2022), Application of Blockchain Technology in Intellectual Property Protection, Wiley, https://doi.org/10.1155/2022/4641559

Mhana, A., Mohammed, G.N., Jabor, F.K. (2019), Enhancing Privacy and Improving Security in Scalable Blockchain, Journal of Southwest Jiaotong University, Vol-54(5), https://doi.org/10.35741/issn.0258-2724.54.5.7

Niu, X., Han, D., & Sun, Z. (2021). Music Copyright Protection and Trading System Based on Consortium Chain. Computer Application Research, 39(1), 6.

Porras.R.E, (2023), Intellectual Property and the Blockchain Sector, a World of Potential Economic Growth and Conflict, Intellectual Property - Global Perspective Advances and Challenges, Published: 05 June 2023, DOI:10.5772/intechopen.1001882

Ruzakova, O., Grin, E. (2017). Applying blockchain to the systematization of the intellectual products, Perm University Herald, Issue 38. Pp. 508–520, DOI: 10.17072/1995-4190-2017-38-508-520

Shi, Q., & Zhou, Y. (2025). Application of blockchain technology in digital music copyright management: a case study of VNT chain platform. *Frontiers*, Vol-7, https://doi.org/10.3389/fbloc.2024.1388832

Sharma.R, (2025), Non-Fungible Token (NFT): What It Means and How It Works, Investopedia, https://www.investopedia.com/non-fungible-tokens-nft-5115211

Sumner.M, (2024), Blockchain for Copyright Protection: 10 Use Cases, ScoreDetect, https://www.scoredetect.com/blog/posts/blockchain-for-copyright-protection-10-use-cases

Singh.Y, (2024), How Blockchain Could Revolutionize Copyright Protection for Creators, Vegavid, https://vegavid.com/blog/how-blockchain-could-revolutionize-copyright-protection-for-creators

Sonisvision, (2025), THE FUTURE OF COPYRIGHT: HOW BLOCKCHAIN IS CHANGING IP PROTECTION, https://www.sonisvision.in/blogs/the-future-of-copyright-how-blockchain-is-changing-ip-protection#:~:

Savelyev, A.I. (2017). Some legal aspects of the use of smart contracts and blockchain technologies in Russian law.

Qizi, L.R.M., Kamalovich, B.K. (2025), Blockchain Technology Usage on Intellectual Property Rights. Int J Semiot Law, Vol-38, pp 363–380. https://doi.org/10.1007/s11196-024-10224-1

Wagner, S. M., Fink, A. A., Ehrnsperger, J. F., & Düpree, P. (2025). Supporting Intellectual Property Protection: Blockchain Technology as a Catalyst for Open Innovation, California Management Review, 67(3), 164-185. https://doi.org/10.1177/00081256251320366

Wang, Z., Feng, W., Huang, M., Feng, S., Mo, S., & Li, Y. (2025). Blockchain-Based Information Security Protection Mechanism for the Traceability of Intellectual Property Transactions. Sensors, 25(10), 3064. https://doi.org/10.3390/s25103064

WIPO, Blockchain and Intellectual Property, Accessed on 01 Nov 2025, https://www.wipo.int/en/web/cws/blockchain-and-ip

Yuanjun.Q and Xiaoli.L,(2018), Digital Copyright Protection Based on Blockchain Technology, International Journal of Knowledge and Language Processing, Vol- 9, pp.61–-70
Zhang, Q., Wu, G., Yang, R., & Chen, J. (2024). Digital image copyright protection method based on blockchain and zero trust mechanism. Springer Nature, Vol-83, pp 77267- 77302. https://doi.org/10.1007/s11042-024-18514-3