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Legal Readiness of Indian Copyright Law for Blockchain-Based Protection of Ancient Manuscripts

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The study investigates the use of blockchain technology to safeguard ancient Indian knowledge systems against theft and commercialization. It seeks to provide a digital recording framework for historical records, oral traditions, and indigenous practices, guaranteeing their enduring preservation. This paper attempts to assess the legal consequences of blockchain technology use, throwing light on need for amending the Copyright Act and Patent Act to protect the Indian traditional texts and knowledge. This study examines the challenges and opportunities of blockchain usage in preserving Indian Traditional knowledge and manuscripts. Here, author has employed doctrinal method of research to examine the legal texts, theoretical frameworks and philosophical discourses. Furthermore, it delves into the peer reviewed articles dealing with blockchain technology and its use in protecting IPR associated with traditional knowledge in India as well as outside India. It studies the existing literature to grind out the possibility of digitization of historical texts and traditional knowledge. The author also analyses the legal frameworks related to blockchain, emphasizing on data authentication, verification, and protection within domains i.e. IPRs and Digital Rights Management (DRM). It also analyses international instances of using blockchain for the conservation of cultural heritage and ancient manuscripts.

Keywords: Indian Ancient Manuscripts, Indian Traditional Knowledge System, IPR, Blockchain, Knowledge Sovereignty, Post-colonial Knowledge Systems

The Indian Knowledge System is a diverse and rich tradition that has developed over millions of years. It is a practice that is deeply rooted in ancient Indian history. It is often defined by its diverse fields to which it deals, i.e. scientific methodology, philosophy, spirituality, mathematics, Ayurveda, Vedic astrology, art, architecture, theology etc.[1] Indian Knowledge System is not a singular monolith, but it comprises several regional and cultural or traditional knowledge that has evolved over the centuries.[2] The IKS is grounded over the oral traditions, ancient scriptures, and artefacts covering a wide range of practices and concepts declarative of ancient Indian civilization.[3]

India has a rich legacy in the study of astronomy, Vedic mathematics evident from *Surya Siddhant* and *Aryabhatta*.[4] Vedic astrophysicists made groundbreaking contributions in understanding the vast solar system, the celestial bodies, planetary motions etc. The IKS is featured by its unique oral tradition. According to the studies, these ancient theories and texts have been transmitted through several generations in the oral form before being inscribed on the paper.[5] This kind of practice was stimulated by the development of scriptures that used to exist in the form of palm leaves, bark, stone and sometimes clay tablets.[6] It is asserted that the Vedas and Vedant before being in the written form used to exist in the oral.[7]

The Sanskrit manuscripts have been meticulously written over generations by the priests and sages. The *Ayurveda* and the other manuscripts dealing with health and medicine contains the age old and vital information about herbal remedies, surgeries and studies of anatomy.[8] However, the aforementioned manuscripts are fragile and have been central in saving the Indian traditional knowledge. Now, the institutions like National Mission for Manuscripts have digitized and classified these manuscripts in an effort to safeguard these from unscrupulous activities of theft and commercialization.

Despite the existence of rich and vast Indian Knowledge System, the preservation of ancient scriptures holding this vast traditional knowledge have remained an uphill task. Imperialism, cultural shifts, and the commercialisation of native practices and traditional knowledge have led to its oblivion, theft, misappropriation and commercialisation. It is

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quite evident from how the western pharmaceutical companies has been engaging in biopiracy of the Indian traditional medicines i.e. turmeric and neem without even compensating the indigenous people.[9] Such challenges are often exacerbated due to the digital divide and lack of awareness of legal provisions with respect to safeguarding of traditional knowledge in the rural India. The unlawful commercial exploitation of Indian traditional knowledge is therefore an important issue to attend to.

In the same manner, sacred texts like *Vedas, Smritis* and philosophy are being diminishingly marketed as some normal self-help book without their rooted cultural import which hurts the sentiments of the masses who religiously follow these texts in their daily lives. This technology driven age has further added new dimensions to the existing challenge.On the one hand, digitising manuscripts assists in protecting them as well as making them easier to find. On the other hand, it has also made simpler for people to replicate and circulate things online without permission, especially modern annotated editions or translations that are protected by copyright laws.[10] The Delhi High Court's verdict in *Bhaktivedanta Book Trust India* v.*www.friendwithbooks.co*. (2024) established that original scriptures may be in the public domain, but translated or commentary-rich versions are protected intellectual property. Sharing these kinds of content online without permission is a violation of copyright. [10]

Although digitisation is frequently regarded as a method to enhance access and preservation, in relation to traditional knowledge (TK) and ancient Indian manuscripts, it engenders intricate issues concerning misuse, decontextualization, and cultural insensitivity. The problem isn't the act of digitising itself; it's that there aren't any rules in place to make sure that the community agrees, that the information is properly credited, and that the cultural importance of these knowledge systems is respected. When sacred texts and traditional practices are digitised, they can be changed, sold, and shared without permission, often without giving credit to the groups that own them. These are not random or anonymous groups; for example, the Nambudiri Brahmins of Kerala are a Vedic scholar lineage that has kept oral traditions of chanting the Vedas, and the *Ashtavaidya* tradition is a family of Ayurvedic practitioners that has kept medical manuscripts for generations. The gap between digital circulation and custodial recognition not only diminishes the cultural significance inherent in these works but also deprives these communities of their moral and material interests. *Bhaktivedanta Book Trust* v *Friendwithbooks. co* (2024) made it clear that even though base texts are in the public domain, modern curated forms like translations, annotations, and contextual commentaries are creative works that should be protected by law.

Traditional libraries often don't have enough security,[11] and palm-leaf manuscripts are lost or stolen because their cataloguing systems aren't good enough.[12] These gaps make it harder to find out who stole what. Even though India's traditional knowledge systems are often misappropriated and used for profit, the communities that protect them rarely get credit or fair pay. This hurts both their cultural dignity and their right to make a living. Further, there is associated trouble in ascertaining the ownership of ancient Indian manuscripts. It is difficult to control its digital proliferation, which exposes the ancient manuscripts to the misappropriation of work and infringement of creator's IPRs in it.

Theft these days is also prevalent with regards to our traditional libraries and ancient manuscripts because of insufficient levels of security.[11] Palm leaf manuscripts and other religious texts are often trafficked.[12] Traditional repositories have had issues with inadequate documentation and cataloguing systems in the past. These problems are improving, but they still make it difficult to find out the origin, movement and use of ancient manuscripts. It therefore becomes very difficult to track the information misappropriated and copied. There have been multiple incidents of Indian traditional knowledge getting commercialised and monetized by the private players without compensating its real custodians.[9] It is not only a misappropriation of traditional knowledge but it also denies rightful livelihoods to their rightful owners.

Things are getting even murkier with the advent of artificial intelligence-based algorithms.These systems, particularly extensive language models predominantly trained on English-language data, frequently fail to encapsulate culturally embedded expressions and philosophical idioms inherent in non-Western traditions. It contends that these models function as "stochastic parrots", producing coherent text devoid of genuine comprehension, potentially resulting in misinterpretations of sacred texts in languages such as Sanskrit or Pali.[13] With the degradation of original manuscripts over time and the older scripts disappearing, it becomes uphill to verify the texts.

AI has induced a lot of counterfeiting and infringement of copyright which is causing the disintegration of ancient wisdom and traditional knowledge.[14] In this situation, blockchain technology is emerging as a powerful tool to preserve and secure the ancient manuscripts and historical records from being counterfeited or misappropriated. It is intriguing to know how blockchain can protect and manage intellectual property, especially with respect to Indian ancient manuscripts and Indian traditional knowledge. With this background, this genesis is an attempt to explore the legal implications of using blockchain technology in preserving the ancient Indian manuscripts and other traditional texts. It is a doctrinal analysis that additionally explores the potential of blockchain technology in managing IPRs in manuscripts with special reference to ancient Indian manuscripts.

Ancient Texts and Copyright Act, 1957

India's ancient texts and scriptures, which includes Vedas, Upanishads, and all the other classical writings on Ayurveda, Yoga, and astronomy etc.are an unparalleled storehouse of intellectual and cultural heritage. But position regarding protecting such literary works under the Copyright Act of 1957 is vague. The reason being these texts are unlike modern works in which they often don't have any known authors. Such ancient works exist in multiple versions, and have been passed down through generations through oral and written traditions. The current law only focusses on modern individual authorship and does not address the infringement of literary works that are sacred as well as historically important.

The Problem with Public Domain

A fundamental strain occurs because most ancient Indian manuscripts are in the public domain under Section 22 of the Copyright Act, which only protects them for 60 years after the author's death.[15]

The public domain makes these works easy to get to, but it also lets businesses use them without any restrictions. Foreign companies have patented Ayurvedic formulations, copyrighted translations of the Upanishads, and even claimed exclusive rights to yoga sequences. All of this has happened without the original owners of this knowledge getting any credit or benefit. The Turmeric Patent Case and the Neem Biopiracy Case are two very clear examples of how India's traditional knowledge is still legally vulnerable, even though it is culturally preserved.[9] The New International Version Bible that was released in the year 1978 is also protected by Copyright by Biblica, Inc. (*Worldview*, 2014). To use this biblical text, authorisation, as well as compliance with the copyright holder is required.

Judicial Approach

The Delhi High Court held in Bhaktivedanta Book Trust v Gopal Krishna Goswami that the original Sanskrit manuscripts of Bhagavad Gita were in the public domain, but translations and commentaries could be protected as derivative works.[16]This case infers that although the fundamental transcript of ancient scriptures may remain available for public use, their contemporary adaptations can still be protected. The court upheld the validity of copyright since there was a modicum of creativity in the adaptations of the manuscripts.

Problem of Shared Authorship

The Copyright Act presumes individual or joint authorship, rendering it inappropriate for texts created collaboratively over centuries. For example, there are different versions of the Mahabharata in different parts of India, each with its own regional differences. Who owns the copyright? The original author, the transcribers who copied it, or the group of people who have kept it alive by performing it and telling it again? The law is vague to answer this question.

Why Copyright Law Isn't Enough Right Now

When we delve into how the Act applies to ancient literary works, we may observe its limits:

(i) Requirement for Fixation: Before being on paper, many texts were passed down orally. Is an 18th-century palm-leaf manuscript of the Rigveda the 'original' fixation?

(ii) Section 13(1): The 'sweat of the brow' doctrine, which protects compilations, is often used by judiciary for example in the celebrated case of Eastern *Book Company* v *DB Modak*. However, whether may we apply this to ancient texts where the 'sweat' spans thousands of years?

(iii) Moral Rights (Section 57): An author can stop their work from being changed, but who protects the integrity of the Bhagavad Gita when it is misrepresented in commercial adaptations?

A New Way: Using Blockchain as a Cultural Archive

India requires a legal framework that is able to protect its ancient scriptures while still being in public domain. Blockchain technology presents an effective solution which will not change its public domain

status, but at the same time validating their origin, monitoring their usage, and guaranteeing recognition of its cultural importance. Blockchain may make it possible for people to access ancient wisdom without having to worry about being taken advantage of, which is different from traditional copyright, which tries to limit access.

Safeguarding Indian Traditional Knowledge through Blockchain Technology

Distributed Ledger Technology (DLT) is a decentralized database that is managed by several people across its various nodes. DLT possesses the ability to record static as well as dynamic data e.g. bank transactions.[17] Blockchain is the most common variant of the DLT.[18] However, other variants may include tangle or hash graph as well. Therefore, blockchain is a decentralized digital ledger which comprises of cryptographically hashed transactions collected into a chain of blocks.[19] After receiving the necessary validation, each such block is linked with the previous block via a cryptographic hash function. Blocks are assigned across the ledger. Its exceptions are resolved based on defined criteria. This chain grows continuously with the addition of new blocks and as soon as the blocks gets older, it becomes challenging to modify it. That is why it ensures the safety in peer-to-peer transactions. Another striking feature of this technology is that it eliminates the need for any middlemen. Blockchain technology has revolutionized the way data is stored, processed and shared in peer-to-peer transaction. It is now being applied to a wide range of applications like medical data, smart contracts, digital identification, financial transactions, asset management etc.

Bitcoin, which was created in 2009, revolutionized peer-to-peer money transfers without the involvement of central authority.[20] Blockchain, similarly proposes innovative solutions to protect intellectual property of the parties involved. Results are documented in digital form with the application of 'Design Thinking Process'.[21] It encompasses spoken, written and modelled forms. The generated hash is documented on the Bitcoin blockchain through secure timestamping service. It provides a verifiable and immutable record of the entire process. Blockchain technology proposes Secure Additive Manufacturing Platform (SAMPL) which aims to develop a comprehensive security solution, also known as '*Chain of Trust*' for additive production processes.[22] With the use of SAMPL, it would be possible to secure the printings with license grant which in turn will help in distinguishing the original print from the counterfeited one.

According to a study conducted in 2023, it was discovered that the application of blockchain to 3D printers created a trust chain between copyright owners and service providers and with this all stages from data creation to component labelling were recorded.[21] As per another study in this realm, where transactions on the blockchain were verified through the senders' private key, prevented changes by parties on either side.[23] Here researcher used multi-agent system for authenticating the intellectual property. According to one other study, blockchain models may help in copyright protection of microfilms by storing the names and scripts as well as of fashion designs.[24] The researcher claimed this inference by combining blockchain and Internet of Things (IoT) using peer-to-peer system for IP management, where cloud-based blockchain was used as the infrastructure.

Permissioned blockchain is a one of the blockchain models which encompasses both public and private networks which facilitates working among associations on a decentralized framework.[25] For example, hospitals, where every single part control the system and reduces the chances of data compromise. It is popularly known as 'Consortium Blockchain' and has potential in IP management. It is where multiple parties manage the network and reduces the risk of data manipulation. One of such examples is the preservation of Islamic scripture '*Hadith*'. According to a research 'Hadith' can be potentially stored using blockchain technology and prevent it from being tampered.[26] Here, the researcher used consortium blockchain to preserve Islamic text.

One other study proves how using an innovative ledger system, commonly known as *HeriLedger*, cultural scriptures and assets can be protect.[27] Immutability of blockchain technology is known for ensuring data integrity which helps in securing the data across the several platforms in diverse time frames much like the way '*the Holy Bible*' successfully passed through centuries despite of lots of prejudices and cultural attacks.

Blockchain's Potential to Combat Copyright Theft

Blockchain technology is an innovative solution to combat copyright infringement in the age of digitalization which is not aided by traditional methods.[28] The key features of this technology include

decentralized framework, transparency, immutability and smart contracts. With the decentralized framework of blockchain, the authors of a literary work may register their works on it which gives them a verifiable, time-stamped version of ownership. It additionally helps in the dispute resolution by its blockchain ledger that provides a clear record of both author's identity and registration date of the work.

Immutability is one of its key features.[25] Whenever any information is written or stored on the blockchain, it becomes permanent and cannot be modified. It may create a record of one's authorship that may serve as evidence in the event of any copyright infringement issue arises.[28] When an author of a creative work like artwork, music or of literary work uploads it online, the blockchain may aid in generating a unique identifier. Such unique identifier is called '*Cryptographic Hash*'. The hash is then added to the blockchain with its timestamp and details, including the name of author and description of the work.[24] This record is the evidence to prove that the author is the rightful owner and would prevent others from infringing upon the author's literary or artistic work.

The major advantage of employing blockchain technology is its ability to implement smart contracts for the purpose of licensing and royalties which in turn may help in combatting copyright infringement.[29] It may also ensure adequate compensation to the author or artist in case of copyright infringement happens. Smart contracts are self-executing contracts. Its terms are directly written into code and such contracts automatically enforce codified rules by eliminating intermediaries. Such contracts can be utilized by the copyright holders to manage licensing contracts and royalties in more efficient way. For instance, an artist can create a smart contract which automatically gives permission to users who want to serve their music for listening or for downloading. The smart contract might specify about the terms of use, payment applicable etc.

Tokenization is that process by which a physical or digital asset is converted into a digital token that exists on blockchain. In case a copyright infringement case arising, it could be a powerful tool for the artists.[30] For example, an artist may tokenize his digital piece into a unique non-fungible token (NFT) which represents ownership over an original digital piece. Such NFT may be bought or sold over blockchain-based marketplaces. Ownership history of such NFT is public and verifiable. Nowadays, there are several firms as well as platforms that have started leveraging blockchain technology to combat copyright infringement and protect IPRs. Some of its examples are Ascribe, Monegraph, Po.et, and KodakOne.[31] Ascribe allows the artists to assert their ownership on its digital art, pictures and other innovations. It issues a digital certificate of ownership for literary or artistic works, transfers the copyright via smart contracts and create a decentralized marketplace for digital content.

But blockchain has significance beyond copyright law. This is especially true when it comes to protecting TK, old manuscripts, and cultural heritage, which are rarely protected by formal intellectual property protections.WIPO (2022), UNESCO[32], and several legal scholars (Antoniou & Batten, 2021; Dutfield, 2020) agree that blockchain can be used not to give someone exclusive ownership, but to "defensive protection". This means preventing unauthorised use, keeping track of where information comes from, and making sure that knowledge-holding communities get credit.

Global efforts are continuously in the direction of investigating the use of blockchain in protecting the traditional knowledge, historical records, manuscripts and prevent its theft. One of its prominent instances include 'UNESCO Digital Library and Blockchain Project'.[32] This project seeks to establish an irreversible record of the manuscripts, artwork and other cultural information in order to guarantee authenticity and traceability. The '*Artory*' is another platform which uses blockchain technology to record and manage provenance of artworks and traditional knowledge.[33] While these records do not confer copyright, they do support broader international ideas of fair benefit-sharing and reverence for customary laws. These ideas can be seen in documents like the Nagoya Protocol, Biological Diversity Act, 2002, and WIPO's Draft Articles on TK Protection. These frameworks put more weight on community rights. Blockchain could be a technological tool that makes it possible to keep track of authorship, usage, and ensure ethical cross-border transfer.

Legal Implications for Blockchain Preservation of Ancient Manuscripts

Blockchain technology signifies a transformative progression in the authentication, tracking, and protection of intellectual property, particularly ancient manuscripts and Indian traditional knowledge.

However, the integration of this emerging technology into Indian Copyright Protection stimuluses essential explorations concerning legal compatibility, enforcement mechanisms, and statutory adaptability. Blockchain offers immutable provenance tracking and decentralised verification, which are indispensable for protecting India's extensive collection of culturally significant manuscripts.[34] However, the current copyright framework is inadequate to address its complexities.

India's ancient manuscripts and scriptures have a complicated relationship with modern copyright law, which creates fundamental tensions that need to be looked at closely. The Copyright Act of 1957, which was made for modern works with known authors, has a hard time dealing with texts like the Vedas, Upanishads, and classical Ayurvedic treatises that have changed over time through the wisdom of many people. This disconnect is most obvious when it comes to authorship, which is the basis of copyright protection. Section 13 of the Act says that protection is only for original works with identifiable creators. This means that most ancient Indian texts can't be protected because they are either anonymous or represent communal knowledge. Judicial efforts to address this matter, exemplified by *Bhaktivedanta Book Trust*. *Gopal Krishna Goswami* (2011), have yielded a partial resolution by safeguarding contemporary translations and commentaries while maintaining original scriptures in the public domain. But this method doesn't solve the main problem: how to keep knowledge safe when it is old, sacred, and easy to exploit because it doesn't have a traditional author.

The 'Biopiracy Paradox' is caused by the fact that these works are in the public domain. Section 22's 60-year posthumous protection term makes sense for modern works, but it doesn't protect texts that are thousands of years old, like the Charaka Samhita. This was clearly shown in *CSIR*. *W.R. Grace* (Turmeric Patent Case, 1997). In this case, traditional knowledge that had been passed down freely in India for generations was now open to patent claims from other countries. The fixation requirement in Section 2(y) is another problem because it doesn't take into account knowledge systems like Vedic chanting or classical dance forms that have been passed down through living traditions instead of written texts. The Sangeet Natak Akademi case (2010) brought this gap to light when traditional performances weren't protected because they were changing and based on the community.

Indian courts have devised various strategies to resolve these conflicts. The Derivative Works Doctrine, as seen in Bhaktivedanta Book Trust, protects new interpretations of works while recognising that source texts are in the public domain. The Compilation Protection approach, based on the case of *Eastern Book Company*. *DB Modak* (2008), protects curated versions of old knowledge. Cases like *Bikram Yoga* v. *Evolation Yoga* (2015) are very interesting because they point to a new idea of Cultural Guardianship, in which traditional knowledge custodians may be able to control commercial use. But these judicial solutions are still piecemeal and don't make a complete system for protecting India's intellectual heritage.

In another landmark case of *The Bhaktivedanta Book Trust*. *Gopal Krishna Goswami* (2011), it is revealed how Copyright Act, 1957 fails to interact effectively when dealing with ancient texts. At the same time, it shows how blockchain technology could help and hurt these problems. The Delhi High Court's decision tried to find a balance between protecting modern interpretations of sacred texts and honouring their ancient roots. It did this by using what some people call a 'bifurcation doctrine', which says that English translations and commentaries are protected by copyright, but the original Sanskrit Bhagavad Gita is not. This method is practical, but it is also legally shaky because it uses the minimal creativity standard from *Eastern Book Company*. *DB Modak* (2008) to protect translations based only on the words used and how they are arranged. The result is a dangerous precedent where minor changes to ancient wisdom can lead to copyright claims, which means that businesses can use legal loopholes to steal cultural heritage.

The case shows that the Copyright Act has some major problems when it comes to traditional knowledge. Section 2(a)(iv)'s broad definition of "adaptations" creates a loophole that allows ancient wisdom that hasn't changed much to become proprietary. Section 52's fair use exceptions don't make a clear distinction between real scholarly work and commercial appropriation. Also, the lack of provenance tracking tools means that derivative works can lose touch with their cultural roots. The 60-year protection term under Section 22 is not enough for cultural works that are still important hundreds of years later, not just decades later.

Blockchain technology offers compelling prospects for bridging these gaps through its ability to enable immutable provenance tracking, potentially establishing an auditable chain of custody from ancient source texts to contemporary derivatives. Smart contracts could make it easier for traditional knowledge communities to share benefits, and distributed timestamping could keep official versions safe and stop people from making changes without permission. But these tech solutions make things more complicated at the crossroads of law and technology. Blockchain networks don't have borders, which makes it hard to enforce copyright law because it is based on territory. There are technical and legal problems with verifying ancient text sources on decentralised networks, especially when it comes to proving their authenticity in order to settle disputes. The fundamental tension between the permanence of blockchain and the temporal limitations of copyright remains unresolved. How can immutable ledger entries coexist with statutory protection periods that anticipate eventual public domain entry?

The Bhaktivedanta case is a small example of the bigger fight to protect traditional knowledge in today's legal systems. Blockchain has some promising technical solutions, but putting them into practice would require a lot of new legal work to fix the problems that the case brought to light and deal with the new problems that the technology itself creates. This entails reevaluating essential copyright principles such as authorship and the duration of protection in relation to ancient texts, formulating new criteria for what qualifies as sufficiently 'original' derivative works of traditional knowledge, and establishing international frameworks to address the jurisdictional challenges posed by decentralised networks.

This leads us directly to some of the primary challenges listed below:

Authorship and Originality: The Main Problem

Under Section 13 of the Copyright Act, only 'original' works with identifiable authorship are protected.[35] This is a problem for ancient Indian manuscripts, which are often communal, anonymous, or passed down orally. Blockchain can timestamp and hash these works to show who owns them, but the law doesn't say for sure if cryptographic proofs alone meet the 'fixation' and 'originality' standards. Judicial precedents like *R.G. Anand. Delux Films*, underlines that copyright law protect expression rather than ideas. However, blockchain's function in preserving intangible heritage (e.g., folk tales, Ayurvedic texts) complicates this distinction. The expediency of blockchain technology in protecting old works is still legally unstable until policymakers step in and identify blockchain-based corroborations as valid proof of authorship.

Reproduction Rights and Decentralisation: A Legal Issue

Section 14 of the Copyright Act confers on copyright holders the right to reproduce their work in any material form including its storage in any form by electronic means.[15] However, but the way blockchain is built, it requires the data needs to be copied across many nodes to keep it safe and open. This issue presents a significant legal challenge. It poses one very important question i.e. whether the decentralised storage represent infringement, or is it regarded as acceptable archival practice. The Delhi High Court's decision in *Super Cassettes*. *Myspace* directed that temporary digital copies might not infringe copyright but the permanence and global circulation of blockchain measures contradict the judicial reasoning. If blockchain is going to be used to preserve manuscripts, the law needs to clearly spell out what kinds of copying are allowed. One way to do this might be to add a clause to Section 52 that says nodal storage is a 'fair use' exception as long as it is used for preservation and not for profit.

Time Limits* v*Records That Can't Be Changed

In India, copyright protection lasts for 60 years after the author's death(Section 22, The Copyright Act, 1957). After that, the works become public domain. But because blockchain is unchangeable, records of old manuscripts could last forever, making it a paradox where works are still 'protected' even after the law says they are no longer protected. This divergence is similar to the uncertainties brought up in the celebrated case of *Eastern Book Company*. *D.B. Modak*, when the Supreme Court cautioned against giving IP monopolies excessive power. Additionally, to make blockchain's permanence work with copyright law's time limits, a practical solution is required.[35] For example, blockchain protocols could use automated 'expiry tags' to make sure that works move smoothly into the public domain when their copyright expires.

Making it happen Problems with a decentralised framework

Sections 51 and 63 of the Copyright Act penalise copyright infringement, but enforcement would be a

challenge here, the reason being the decentralised nature of blockchain technology. Blockchain networks don't have a central authority that could be held accountable for violations like traditional intermediaries do like internet service providers. The Bombay High Court's pronouncement in *Tips Industries* v *Wynk Music* held digital platforms liable for hosting infringing content, but this precedent does not hold up when it comes to peer-to-peer blockchain nodes. One possible solution could be to amend the Information Technology Act, 2000 to include 'decentralised liability' principles. This would mean that node operators in India could be held responsible for hosting pirated content, even if the blockchain itself is global.

Smart Contracts and Licensing: Legal Questions

Smart contracts on the blockchain could make it easier to pay royalties and get licenses for digital manuscripts, but it's not clear if Indian law would let them do that. [29] Section 30 of the Copyright Act says that assignments must be in writing, but smart contracts are run by code and often don't bear any 'signatures' like other contracts do.[15] The IT Act, 2000 (Section 10A) recognises electronic contracts, but courts have emphasized the importance of clear consent such as in the case of *Trimex International*. *Vedanta Aluminium*, 2010.[37] This is something that smart contracts may not be able to show. For blockchain to work efficiently in the direction of copyright protection, the amendments in law must explicitly allow self-executing contracts for copyright transactions given that they follow the fundamental principles of contract law.

Conclusion

No doubt, the blockchain technology has the potential in transforming the digital rights management (DRM) via provision of secure and transparent monitoring of the authorship or ownership of the creative works. Also, it can be helpful in mitigating copyright infringement by providing an immutable record of the ownership of a work and the smart contracts may autonomously distribute royalties to the stakeholders. However, the Copyright Act, 1957 in its present form does not protect the Indian traditional knowledge and ancient texts. It is imperative that the law is amended to include collective ownership of traditional works i.e. indigenous communities. This way, the external parties cannot monetize the ancient works and traditional knowledge without the prior consent of the communities to whom such knowledge or know-how belongs. Many ancient manuscripts are now centuries old and do not fall under the modern criterion for copyright protection. Therefore, specific safeguards should be introduced for the cultural and religious works, even if they fall under the definition of public domain. Because, cultural significance of such manuscripts renders them deserving of protection.

The Patent law should include a clear exclusion of patentability of traditional knowledge in order to safeguard it from being patented by the foreign persons and institutions. This must also ensure the measures to be taken to prevent the biopiracy of the Indian Traditional Knowledge. At the national level, a National Blockchain registry may be instituted which may employ blockchain technology to digitize and authenticate the ownership, history and provenance of the manuscripts. Institution of a national registry can prove to be helpful in preventing unauthorized use and theft of ancient knowledge and scriptures by timestamping such texts. However, for now, the practical implementation of blockchain may include a transferable digital certificate.

Smart contracts could be leveraged to ensure the provision of fair compensation to the indigenous groups when their traditional knowledge is used by any foreign person or institution.[29] Such contracts may help in giving credit for the traditional knowledge to its rightful owners when such traditional knowledge or ancient text is commercialized. Legal reforms are necessary to ensure that prior informed consent and access and benefit-sharing mechanisms provide security under blockchain-based systems. That way, communities cannot be taken advantage of and their intellectual contributions are justly compensated. For many communities in rural locations, there are significant challenges derived by the digital divide and technological boundaries. Overcoming this divide could be done through government incentives for blockchain adoption, which would include training and financial support for communities that want to register their traditional knowledge digitally. By giving local communities, the means to protect their intellectual property, blockchain can become a force for empowerment instead of exploitation. In order for this solution to be actualized, Blockchain could be integrated with existing initiatives like National Digital Library of India (NDLI) or the Traditional Knowledge Digital Library (TKDL) to provide authenticity and traceability of manuscripts.

Blockchain can also be implemented by these digital entities to record the traditional knowledge and historical texts securely, preventing unauthorized parties from taking advantage of these and keeping the same for future generations. Our understanding of knowledge diffusion and its misappropriation is not limited to our local jurisdictions. Therefore, India must come out as a forefront to convene international treaty that would standardizes rules and regulations for utilizing blockchain models to authenticate and protect TK on global level. It will help in addressing the legal and security issues related to theft and misappropriation of ancient texts and knowledge which will further ensure that the indigenous communities could get due credit for their knowledge and could get compensated in case of its commercialization.

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