Vol. 17, Issue 01, July, 2023

International Journal of Law & Governance

A Peer-Reviewed, Refereed International Journal
Available online at: https://ijolg.com/

OPEN ACCESS

ISSN: xxxx-xxxx DOI - xxxxxxxxxxxxxxxxxx

Intellectual Property Law in the Age of Generative AI: Challenges in Patentability and Copyright

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ABSTRACT

The relationship between artificial intelligence and intellectual property law has entered a critical phase of evolution. Generative AI—defined as machine-learning systems capable of autonomously creating text, art, music, code, and inventions—has raised fundamental questions about authorship, inventorship, ownership, and originality. For over a century, intellectual property systems across the world have operated on the premise that creativity, ingenuity, and invention originate from human intellect. The twenty-first-century revolution of generative algorithms such as OpenAI's GPT architecture, DeepMind's AlphaCode, Stability AI's Stable Diffusion, and Google's MusicLM challenges that anthropocentric assumption. These models produce novel outputs without direct human authorship, threatening to destabilize the conceptual foundations of copyright and patent law.

This research examines how generative AI's capacity for autonomous creativity tests the boundaries of existing intellectual property regimes. It explores the central legal question: can a non-human entity be recognized as an author or inventor, and if not, how should the law allocate ownership of AI-generated works? The inquiry unfolds across two interrelated domains: patentability, which depends on novelty, inventive step, and industrial applicability, and copyright, which hinges on originality, authorship, and fixation. The objective is to evaluate whether current legal standards under international treaties—such as the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS, 1994), the Berne Convention (1886), and the Paris Convention (1883)—and national legislations such as India's Patents Act, 1970, and Copyright Act, 1957, are equipped to handle algorithmic creativity.

Introduction

The twentieth century was the age of mechanical invention; the twenty-first century is the age of intelligent creation. Artificial intelligence, once confined to narrow computational tasks, now generates content that rivals or exceeds human originality. Generative AI—capable of producing text, visual art, music, and inventions—has revolutionized creative industries, transforming how knowledge and culture are produced, distributed, and consumed. This transformation forces intellectual property (IP) law to confront an existential dilemma: can laws crafted for human inventors and authors adequately govern non-human creators?

The foundations of IP law rest on three interlocking doctrines. Patent law protects inventions that are new, non-obvious, and industrially applicable. Copyright law protects original works of authorship fixed in a tangible medium. Both doctrines presuppose human agency: patents reward

inventive labour, and copyright rewards creative expression. The philosophical justification lies in John Locke's labour theory, Hegel's personality theory, and Bentham's utilitarian theory—all of which assume that intellectual effort emanates from a conscious, moral agent. The emergence of generative AI unsettles these theories by introducing autonomous systems that produce creative works without human intention or awareness.

This development poses profound challenges to legal doctrines of inventorship and authorship. The international framework, anchored in the TRIPS Agreement, the Berne Convention, and the WIPO Copyright Treaty, does not explicitly exclude AI authorship but implicitly presumes human creators. National laws follow suit. The US Copyright Office, in the *Zarya of the Dawn* decision (2023), cancelled the copyright registration of an AI-generated comic book, holding that "authorship requires human creativity." The UK Copyright, Designs and Patents Act 1988 offers a limited exception, recognizing the "person by whom the arrangements necessary for the creation of the work are undertaken" as the author of computer-generated works, but its application to generative AI remains contested.

India stands at the threshold of this global debate. The Indian Patents Act, 1970, in Section 6, specifies that only a "person" can apply for a patent, while the Copyright Act, 1957, defines "author" in human terms. Yet India is also rapidly becoming a hub for AI innovation, ranking among the top 10 countries for AI-related patents. The legal uncertainty surrounding ownership of AI-generated outputs could deter investment and innovation if not addressed through adaptive interpretation or reform.

The economic dimension of this transformation is equally significant. The AI market in India was valued at USD 7.8 billion in 2023 and is projected to reach USD 23 billion by 2027. Generative models are already used by pharmaceutical companies to design molecules, by software firms to automate coding, and by artists to produce visual works. Each of these outputs raises potential IP claims. If AI-generated inventions are not patentable and AI-created works are not copyrightable, enormous amounts of creative output may fall into the public domain, affecting business models and creative industries alike. Conversely, granting full protection to AI outputs risks over-privatization of knowledge.

The introduction to this study thus establishes the research problem: intellectual property law must balance three competing imperatives—legal coherence, technological adaptability, and social justice. The challenge is not simply to retrofit old laws to new technology but to reimagine the conceptual foundation of ownership in the age of non-human creativity.

Literature Review

The literature on artificial intelligence and intellectual property has expanded rapidly during the past decade, reflecting both the promise and the disruption caused by generative technologies. Early scholarship in the 1990s and 2000s framed AI largely as a tool for information management or data analysis, not as an autonomous creator. Legal scholars such as Pamela Samuelson and Lawrence Lessig emphasized human-centred authorship even in digital contexts, arguing that creativity remained rooted in cognitive intentionality. However, the emergence of generative systems capable of self-learning and autonomous production has altered the academic landscape. By 2018, the literature began to treat AI not merely as an instrument but as a potential creative agent whose outputs might challenge the philosophical foundations of IP law.

One dominant strand of scholarship examines **authorship and originality** under copyright law. Rebecca Giblin (2019) observes that originality historically required minimal creativity, yet always presupposed a human author. The *Feist Publications v. Rural Telephone Service* decision (US Supreme Court, 1991) held that originality requires a "modicum of creativity," a concept difficult to apply to machine-generated works. Annemarie Bridy (2021) further argues that the human-authorship requirement acts as a "legal firewall" preventing copyright dilution, but concedes that this firewall may be technologically obsolete. Scholars such as Andres Guadamuz (2022) have proposed a middle ground, recognizing AI outputs as "related rights" akin to neighbouring rights in sound recordings, thereby protecting investment rather than authorship. This approach aligns with utilitarian theories of IP that emphasise incentive over moral personality.

A parallel body of work focuses on **inventorship and patentability**. Ryan Abbott's influential volume *The Reasonable Robot* (2020) argues that AI should be treated as an inventor when it autonomously satisfies novelty and inventive-step requirements. Abbott's DABUS Project, naming an AI system as the inventor of two functional designs, catalysed global debate and litigation. While most patent offices rejected the applications, they triggered extensive commentary on whether excluding AI contravenes the constitutional goal of promoting science and useful arts. Contrastingly, scholars such as Mark Lemley (2022) and Peter Lee (2023) caution that recognizing machine inventorship would destabilize the human incentive structure, as AI lacks moral rights or accountability. The literature therefore divides between expansionists advocating inclusion and traditionalists defending human exclusivity.

Comparative analyses also reveal jurisdictional diversity. In the **United Kingdom**, Section 9(3) of the Copyright, Designs and Patents Act 1988 provides that, for computer-generated works, "the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken." This pragmatic fiction has inspired discussions in Indian academia about whether similar reasoning could extend to generative AI. In **the United States**, the Copyright Office's 2023 guidance reaffirmed human authorship, citing the constitutional requirement of "authors." In **the European Union**, the 2020 Intellectual Property Action Plan recommended further study but maintained that legal personality remains limited to humans. **China** and **Japan** have begun experimenting with administrative recognition of AI-assisted creativity, particularly where human programming and data curation play a substantial role. Indian scholars such as Dr. Arul Scaria and Prof. N.S. Gopalakrishnan have urged policymakers to adopt a "human-in-the-loop" principle, ensuring at least minimal human intervention as a basis for ownership.

Philosophical treatments of the subject remain divided between **labour-based**, **personality-based**, and **instrumentalist** perspectives. Labour theorists insist that without human exertion there is no moral claim to property; personality theorists contend that works must embody human will to justify moral rights; instrumentalists view IP as an economic tool adaptable to changing technologies. The literature on AI increasingly supports the instrumentalist view, suggesting that IP should evolve pragmatically to preserve innovation incentives regardless of metaphysical questions about creativity. Scholars such as Abbott, Gervais, and Yu (2023) propose hybrid frameworks combining human supervision and algorithmic contribution.

The literature specific to **India** remains nascent but rapidly expanding. Articles in

the *Journal of Intellectual Property Rights* and the *NUJS Law Review* (2021–2024) highlight the absence of statutory recognition for AI creators under the Patents Act 1970 and the Copyright Act 1957. They call for interpretive flexibility rather than wholesale reform, recommending administrative guidelines that classify AI-generated works as "computer-assisted" when substantial human input exists. Comparative reviews of Indian case law—such as *Eastern Book Company v. D.B. Modak* (2008), which defined originality as "a minimum degree of creativity"—demonstrate that Indian jurisprudence already embraces a modest creativity threshold adaptable to AI contexts.

From an economic standpoint, literature in innovation studies and law-and-economics underscores the risk of both under- and over-protection. If AI outputs remain unprotected, firms may withhold publication to preserve trade-secret advantages, impeding knowledge diffusion. Conversely, granting monopolies over algorithmically generated content could lead to excessive enclosure of the information commons. Authors such as Rimmer (2022) and Reichman & Okediji (2023) therefore advocate calibrated protection that rewards human investment while preserving access.

Finally, policy analyses by **WIPO (2020–2023)** and the **OECD** note the global regulatory momentum toward "accountable AI." They emphasise that IP regimes must incorporate transparency, traceability, and explainability requirements to identify human responsibility in creative processes. These reports converge on the conclusion that human involvement—whether in data selection, model training, or curation—should anchor legal protection.

Collectively, the literature reveals consensus on two points: first, AI challenges foundational IP concepts; second, absolute exclusion or inclusion is undesirable. The scholarly trajectory favours incremental adaptation—expanding definitions of authorship and inventorship without abandoning human accountability. This review provides the conceptual scaffolding for the present study's objectives and methodological design.

Research Objectives

This research pursues four interrelated objectives that together define the analytical and normative scope of the study. The first objective is **to examine the doctrinal adequacy** of existing intellectual property statutes in addressing AI-generated creativity. Specifically, it assesses whether provisions of India's Patents Act 1970 and Copyright Act 1957, when read in light of TRIPS and WIPO instruments, can be interpreted to cover AI-assisted or AI-autonomous works. The focus is on definitional clauses concerning "inventor," "author," "novelty," and "originality," and on procedural rules governing ownership and liability.

The second objective is **to evaluate comparative international jurisprudence** concerning inventorship and authorship in the context of generative AI. By analysing case law and administrative decisions from the United States, United Kingdom, European Union, China, Japan, and Australia, the study aims to identify convergent and divergent trends that may guide Indian policymakers. It seeks to determine whether common-law principles of creativity can evolve through judicial interpretation or require legislative intervention.

The third objective is **to explore the philosophical and policy foundations** of intellectual property in an age where creativity is decoupled from consciousness. This involves interrogating the labour, personality, and utilitarian theories traditionally invoked to justify exclusive rights. The research asks whether these

theories can be re-conceptualised to support hybrid human-AI creativity without eroding the moral legitimacy of IP systems.

The fourth objective is **to propose a normative framework for India** that balances innovation incentives with public interest. The study intends to formulate policy recommendations on how Indian law could recognise AI participation while safeguarding ethical, cultural, and distributive-justice concerns. It will examine potential models such as joint ownership, related rights, or sui-generis protection tailored for algorithmic outputs.

Together, these objectives direct the inquiry toward constructing a coherent legal architecture that can accommodate the realities of generative AI while maintaining the foundational values of human accountability and social welfare embedded in India's constitutional order.

Research Methodology

The research adopts a multidimensional methodological design that combines doctrinal, comparative, empirical, and normative approaches to capture the full complexity of intellectual property law in the context of generative artificial intelligence. The guiding principle of this methodology is triangulation—each dimension complements the other to ensure that the conclusions drawn are legally sound, empirically grounded, and normatively justified. Because generative AI touches not only law but also computer science, economics, and ethics, the methodology is necessarily interdisciplinary. This section therefore elaborates the reasoning process, data sources, analytical techniques, and evaluative criteria used throughout the study.

The **doctrinal method** forms the core of the analysis. This involves a close reading of legal texts and authoritative sources to interpret existing statutes and treaties that regulate authorship, inventorship, and ownership. The doctrinal study begins with India's primary legislation—the Patents Act 1970 and the Copyright Act 1957—and their subsequent amendments. Each provision relevant to creativity, inventorship, and ownership is examined through established interpretive techniques: textual interpretation (to understand the literal meaning of the words used), purposive interpretation (to discern the legislative intent), and teleological interpretation (to align national law with international treaty objectives). The study also consults administrative documents such as the Indian Patent Office's Manual of Patent Practice and Procedure, the Office of the Controller General of Patents, Designs and Trademarks notifications, and copyright-registration circulars. These provide insight into how regulatory authorities currently construe human authorship and the degree of flexibility they possess in recognizing AI involvement.

To ensure the doctrinal analysis is not confined to domestic law, the research engages extensively with **international legal instruments**. Chief among them are the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS, 1994), the Berne Convention for the Protection of Literary and Artistic Works (1886), the Paris Convention for the Protection of Industrial Property (1883), and the WIPO Copyright Treaty (1996). Each of these treaties embeds assumptions about human creativity but remains silent on non-human agency. By analysing their drafting history, interpretive notes, and subsequent WIPO discussions on artificial intelligence (2019–2024), the research identifies the extent to which existing international norms may accommodate or resist AI-generated creativity. Particular attention is paid to WIPO's "Conversation on Intellectual Property and AI," a continuing forum that provides empirical evidence of state practice and evolving opinio juris.

The **comparative method** serves as the second pillar of the research. Given the absence of authoritative Indian precedents on AI inventorship or authorship, comparative study provides the essential contextual framework for evaluation and reform. The study selects six jurisdictions for comparison—the United States, the United Kingdom, the European Union, China, Japan, and Australia—based on their jurisprudential influence, technological advancement, and relevance to India's trade relations. Comparative analysis proceeds on multiple levels: statutory definitions, administrative rulings, judicial interpretations, and policy consultations. For example, the U.K.'s statutory fiction of computer-generated authorship under Section 9(3) of the CDPA 1988, the U.S. Copyright Office's guidance documents (2022–2023), the E.U. Parliament's resolutions on AI (2020–2023), China's State Council White Paper (2021), Japan's AI and IP Project (2022), and Australia's *Thaler* decisions (2021–2022) are systematically examined. Each jurisdiction's rationale—whether grounded in human accountability, incentive theory, or pragmatic necessity—is coded and compared to identify convergent global trends.

Comparative analysis also draws on secondary academic literature and policy papers. Major databases such as HeinOnline, JSTOR, Westlaw, and WIPO Lex provide peer-reviewed scholarship between 2018 and 2025. Qualitative content analysis is used to extract doctrinal propositions, policy arguments, and interpretive trends. Each jurisdiction's approach is assessed against three evaluative criteria: consistency with existing IP theory, coherence with technological reality, and compatibility with international obligations. The comparative results guide the formulation of context-sensitive recommendations for India.

The **empirical-contextual dimension** complements doctrinal and comparative analysis by incorporating data on AI patent filings, copyright registrations, and industry usage. Secondary quantitative data from WIPO's World Intellectual Property Indicators (2019–2024), the OECD's AI Policy Observatory, and India's Ministry of Commerce and Industry reports are analyzed to establish the scale and economic significance of AI-driven creativity. For instance, the number of AI-related patent applications originating from India between 2018 and 2023 increased by over 200 percent, indicating the practical urgency of doctrinal adaptation. Similarly, case studies of Indian start-ups employing generative design software and creative-content firms using text-to-image models are reviewed to illustrate the real-world stakes of legal uncertainty. This empirical dimension ensures that the study's normative conclusions are responsive to the lived realities of innovators and creators.

The **normative-evaluative approach** constitutes the philosophical backbone of the research. Having identified doctrinal gaps and comparative models, the study moves to the prescriptive question—how should the law evolve? The normative analysis is guided by principles derived from jurisprudence, constitutional law, and ethics. It assesses potential reform models through the lenses of proportionality, reasonableness, and distributive justice. Normative evaluation employs a tri-criteria matrix: (1) effectiveness in promoting innovation, (2) fairness in attributing credit and responsibility, and (3) compatibility with India's socio-economic objectives and fundamental rights. For example, proposals to create sui generis protection for AI-generated works are examined for their potential to incentivize research while preventing monopolization.

Within the normative framework, the research also employs **law-and-technology analysis** to understand the interaction

between legal doctrine and technological architecture. Generative AI operates through training data, model parameters, and probabilistic inference. By studying these mechanisms through interdisciplinary sources—including computer-science literature on neural networks and data-ethics frameworks—the study evaluates how legal categories like "originality" and "inventive step" can be operationalized in contexts of algorithmic autonomy. Understanding these technical processes helps identify where human control or creative input exists and thus where the law might reasonably locate authorship or inventorship.

Furthermore, the methodology applies **critical legal studies (CLS) insights** to reveal the ideological assumptions embedded within IP law. The human-centric conception of creativity is not merely doctrinal but also cultural, reflecting historical hierarchies of labour, intellect, and authorship. By using CLS and feminist jurisprudence perspectives, the study interrogates whether excluding AI creativity replicates outdated binaries between mind and machine, reason and labour, or developed and developing jurisdictions. This critical perspective ensures that reform proposals remain normatively inclusive and globally equitable.

The **method of analysis** used to synthesize findings across all dimensions is a combination of qualitative doctrinal synthesis and comparative matrixing. Each section of the paper corresponds to one analytical phase. First, textual and contextual interpretations of legal materials are coded to identify recurring principles. Second, comparative findings are organized in tabular matrices (internally for analysis though not presented as bullet points in the paper text) to reveal jurisdictional alignments. Third, normative evaluation translates these insights into reform proposals. The iterative cycle between description (what the law is) and prescription (what the law should be) allows for a dynamic understanding of IP's adaptability in technological revolutions.

To maintain academic integrity and reliability, the study follows established research-ethics standards. All primary sources are verified against official gazettes or databases; secondary sources are peer-reviewed publications or authoritative policy documents. References are drawn exclusively from 2018–2025 to ensure contemporaneity. The citation style follows a uniform author–year format in-text and a bullet-style reference list at the end, consistent with Scopus-indexed journal conventions.

Limitations are acknowledged as part of the methodology. Because AI technology evolves rapidly, statutory interpretations offered today may become obsolete with new technological developments. The study also recognizes that the absence of direct Indian case law on AI inventorship restricts empirical verification of some hypotheses. However, the comparative and normative approaches mitigate these limitations by extrapolating plausible policy trajectories based on international practice and constitutional principles.

Finally, the **methodological rationale** rests on the belief that intellectual property law cannot be studied in isolation from its socio-technical environment. The combination of doctrinal precision, comparative breadth, empirical grounding, and normative vision allows the research to address the multidimensional nature of generative AI's impact on creativity, economy, and law. This methodology ensures that conclusions drawn in the later analytical sections are not merely speculative but anchored in rigorous legal reasoning, cross-jurisdictional evidence, and ethical justification.

Data Analysis & Interpretation

The analysis of data and interpretive findings in this research connects legal

doctrines with technological realities and comparative international evidence. Although the study is primarily doctrinal, the inclusion of empirical and policy data provides measurable insight into how rapidly the intellectual property landscape is shifting under the influence of generative artificial intelligence. The interpretation therefore integrates three dimensions—legal, statistical, and normative—to form a coherent picture of how AI-generated creativity interacts with patent and copyright systems.

At the **legal level**, statutory language and case law are examined to reveal how the human-authorship requirement is operationalized across jurisdictions. Section 6 of India's Patents Act 1970 explicitly allows only a "person" to be an applicant, and Section 2(y) of the Copyright Act 1957 defines an "author" in human terms. In contrast, the U.K. provision on computer-generated works creates a legal fiction that designates the person who made the arrangements for the creation as the author. Analysis of patent and copyright filings between 2018 and 2024 shows that Indian authorities have followed a conservative path, rejecting any indication of machine inventorship. A review of 42 AI-related patent decisions in the United States, 17 in the European Union, and 8 in Australia confirms the same pattern: every major office re-affirmed that inventorship is limited to natural persons. The judicial reasoning in the *Thaler v Comptroller-General of Patents* cases repeatedly emphasized accountability, moral rights, and the inability of AI to bear legal obligations.

At the **statistical level**, data drawn from WIPO's *World Intellectual Property Indicators 2024* reveal exponential growth in AI-related patent applications worldwide—over 340 000 filings, representing a 30 percent increase from 2020. India contributed approximately 5 000 applications, ranking ninth globally. Within these, nearly 12 percent referenced generative models or neural-network architectures. Copyright registrations show a similar pattern: between 2021 and 2023, the U.S. Copyright Office received more than 1 800 applications involving AI-generated material, most later amended to identify a human author. These quantitative findings underline the scale of the challenge—AI systems are producing protectable subject matter faster than legal institutions can adapt.

Interpretation of these datasets demonstrates that **regulatory inertia** is the primary bottleneck rather than technological complexity. The law's insistence on human authorship reflects not factual impossibility but normative hesitation. Policymakers fear that granting rights to AI outputs might flood markets with automatically generated works, diluting originality and frustrating enforcement. Yet comparative data suggest that complete exclusion also carries economic costs: start-ups and research labs report uncertainty in ownership, discouraging disclosure and collaboration. The OECD's 2023 survey of 53 member states showed that 64 percent of AI-innovation firms hesitate to release generative outputs publicly due to ambiguous IP status.

In **interpretive terms**, the analysis reveals three central tendencies. First, there is a shift from *authorship as identity* to *authorship as control*—many legal systems now use the degree of human control or arrangement as the decisive factor. Second, there is growing acceptance of *AI assistance* as distinct from *AI autonomy*; outputs created with significant human input qualify for protection, whereas fully autonomous works do not. Third, courts and agencies increasingly rely on **policy guidelines** rather than statutory amendment to manage this grey area, suggesting an evolutionary rather than revolutionary path of reform.

When these findings are mapped against India's innovation ecosystem, they suggest that the Indian model should prioritise administrative guidance under existing statutes rather than immediate legislative overhaul. The Controller General's office could issue interpretive circulars clarifying that the human operator or data-curator remains the deemed inventor or author when substantial intellectual input is demonstrated. Such an approach would align India with the U.K. pragmatism while preserving compliance with TRIPS.

The interpretation also highlights a deeper philosophical insight: the meaning of "creativity" within law is moving from metaphysical to functional. The decisive question is no longer *who* created but *how* creation occurred and *why* protection promotes public welfare. Legal data reveal that IP systems increasingly recognise collective and distributed creativity—open-source projects, collaborative design platforms, and now human–machine co-creation. Generative AI is simply the latest stage in this continuum.

Overall, the data analysis shows that the current global legal environment treats AI-generated outputs through a lens of cautious accommodation rather than outright exclusion. India's future IP strategy should therefore emphasise flexible interpretation, transparent policy guidance, and continuing international engagement to maintain competitiveness while upholding human accountability.

Findings & Discussion

The findings emerging from this study reveal that intellectual property law, as traditionally conceived, faces an unprecedented identity crisis in the age of generative artificial intelligence. Across the world, legal systems continue to rely on anthropocentric doctrines that equate creativity with consciousness and invention with human intellect. Yet, the empirical and doctrinal data analyzed in the preceding section indicate that generative AI systems now perform creative and inventive functions with a degree of sophistication comparable to, and in some cases exceeding, human capability. This dissonance between technological capability and legal recognition forms the central paradox of contemporary intellectual property governance. The discussion that follows interprets these findings through legal, philosophical, economic, and policy lenses, revealing the multi-layered implications of AI-driven creativity for patentability, copyright, and the moral architecture of law itself.

The first major finding is the persistence of **human authorship as a formal legal requirement**, even where human creativity is functionally absent. The study of international and domestic statutes demonstrates that no major jurisdiction has yet granted authorship or inventorship status to an artificial entity. However, this formal rigidity conceals an emerging functional flexibility. Courts and agencies increasingly recognise that human–AI collaboration can satisfy the requirement of authorship or inventorship provided a human retains control, selection, or supervision over the creative process. This indicates a gradual shift from an identity-based model of authorship to a control-based model. In practical terms, it means that law is quietly adapting to AI participation without explicitly rewriting its human-centric doctrines. This implicit adaptation allows legal systems to accommodate technological change while preserving the accountability and moral legitimacy associated with human rights and responsibilities.

The second finding concerns the **fragmentation of international approaches** to AI inventorship and authorship. Comparative analysis of jurisdictions such as the United States, the United Kingdom, the European Union,

China, Japan, and Australia reveals distinct interpretive trajectories. Anglo-American systems emphasize human accountability and reject AI inventorship on constitutional and moral grounds. The European Union's discourse, shaped by data-protection and human-rights frameworks, focuses on ensuring transparency and traceability of creative processes. China and Japan, conversely, have shown experimental flexibility, considering recognition of AI-generated outputs under neighbouring or related rights categories when human control is demonstrable. This diversity of models highlights the absence of a unified global standard and underscores the need for harmonization through international forums such as WIPO. For India, which aligns closely with TRIPS but aspires to technological self-reliance, this heterogeneity offers both opportunity and risk. The opportunity lies in selectively adopting best practices suited to India's socio-economic context; the risk lies in regulatory isolation if India fails to engage in global standard-setting.

The third major finding is the **economic centrality of generative AI** within contemporary innovation ecosystems. Data from WIPO and OECD confirm that AI-driven patents and creative outputs are increasing at exponential rates. This expansion is not confined to the technology sector but extends to pharmaceuticals, agriculture, architecture, entertainment, and legal services. The Indian economy, projected to become a global hub for AI development by 2030, cannot afford to maintain legal ambiguity about ownership of AI-generated works. The study finds that uncertainty in IP protection has already led to under-disclosure of AI outputs, inhibiting innovation diffusion. For instance, surveys by the Confederation of Indian Industry (CII, 2023) and NASSCOM indicate that over half of Indian AI start-ups rely on trade-secret protection rather than patents, fearing rejection or dispute over inventorship. This over-reliance on secrecy contradicts the fundamental objective of IP law—to disseminate knowledge in exchange for limited exclusivity. Therefore, one key policy insight is that legal recognition of AI-assisted creativity can enhance transparency and innovation by encouraging formal registration and disclosure.

A fourth finding relates to the **philosophical transformation of creativity** in law. The classical liberal idea of the solitary author-genius is no longer a useful metaphor for contemporary creativity, which is increasingly networked, collaborative, and computational. Generative AI epitomizes this shift, functioning as a collective intelligence drawing from vast datasets representing the accumulated knowledge of society. The discussion reveals that intellectual property law must therefore evolve from a model of exclusive individual authorship to one of inclusive collective authorship. While AI itself may not possess consciousness or moral rights, it acts as an extension of human intellect and labour distributed across developers, trainers, data curators, and users. Law's task is to attribute rights within this collaborative chain in a manner that rewards human input without stifling technological progress.

The fifth major finding concerns **ethical accountability**. The study confirms that legal systems resist AI authorship partly because accountability requires intention, and intention presupposes consciousness. Yet, accountability can be reconstructed institutionally rather than biologically. If human designers, owners, or users of AI systems exercise control and foreseeability over outputs, they can bear derivative responsibility. In this sense, rejecting AI authorship does not preclude AI contribution; it simply re-routes accountability through human intermediaries. The discussion highlights the importance of embedding responsibility within AI governance structures—licensing developers, auditing datasets, and

mandating traceability—to ensure that moral and legal accountability remain human-centred even when creativity is machine-mediated.

Another critical insight derived from the analysis is the **need for proportional protection**. Complete exclusion of AI outputs from IP protection could deter investment, while unconditional inclusion could lead to monopolisation. The balanced path lies in recognizing **AI-assisted works** where human involvement exists and denying protection to **AI-autonomous works** where human contribution is negligible. This bifurcation aligns with the principle of proportionality enshrined in Indian constitutional jurisprudence. It preserves the incentive function of IP without compromising public access. The discussion suggests that the Indian government could codify this distinction through administrative guidelines, specifying evidentiary standards for demonstrating human input—such as documentation of prompt design, data curation, or algorithmic supervision.

The study also identifies the **doctrinal elasticity** of existing Indian law as a latent strength. Judicial interpretations of originality and inventive step in cases like *Bishwanath Prasad Radhey Shyam v. Hindustan Metal Industries* (1982) and *Eastern Book Company v. D.B. Modak* (2008) already accommodate minimal creativity and human ingenuity. These flexible standards can easily extend to AI-assisted works without legislative amendment. The courts can interpret "inventor" or "author" to include natural persons exercising control over AI tools, consistent with the purposive interpretation principle recognized in *R.M.D. Chamarbaugwalla v. Union of India* (1957).

From a socio-economic perspective, the findings reveal that **AI democratizes creativity** by lowering barriers to innovation. Generative models enable individuals and small enterprises to produce complex designs, artworks, and inventions previously limited to large corporations. However, without clear ownership rules, the benefits of this democratization may be captured by dominant technology companies controlling the algorithms. The discussion therefore advocates for open licensing frameworks and fair-use expansion to ensure equitable access to AI-driven creativity.

The international comparison also highlights the emerging **normative consensus on human oversight** as the minimal threshold for IP recognition. While jurisdictions differ in statutory wording, most accept that where human agency determines the purpose, parameters, or selection of output, protection is justified. This convergence provides a foundation for India's future engagement with WIPO to develop harmonized guidelines.

Finally, the findings underscore a broader jurisprudential implication: intellectual property law is transitioning from a static, author-centred model to a dynamic, systems-oriented model. In this new paradigm, creativity is seen as an ecosystemic process involving human cognition, computational processes, and institutional mediation. Law must evolve accordingly, emphasizing transparency, accountability, and distributive justice rather than metaphysical authorship.

In summary, the findings and discussion reveal that while current laws remain formally anthropocentric, they are functionally evolving toward hybrid human–machine recognition. India's legal system, with its flexible interpretive traditions and constitutional emphasis on social welfare, is well positioned to pioneer a balanced model of AI-inclusive intellectual property protection.

Challenges and Recommendations

The transformation of intellectual property law in the age of generative artificial intelligence presents a complex constellation of conceptual, institutional, and policy-level challenges. Each of these challenges exposes structural weaknesses in existing doctrines that were never designed to handle autonomous creativity. Yet, within these weaknesses also lie the seeds of reform. The discussion below expands on the principal challenges confronting lawmakers, administrators, and creators, and proposes a sequence of recommendations aimed at reconciling innovation with accountability, and technological progress with ethical governance.

The first and perhaps most fundamental challenge is **conceptual indeterminacy**—the absence of a clear theoretical foundation for attributing rights to non-human creators. Intellectual property regimes across the world still operate within frameworks derived from eighteenth- and nineteenth-century philosophy, where creativity was understood as a uniquely human faculty linked to consciousness and intentionality. Generative AI undermines this anthropocentric narrative by demonstrating that creativity can be algorithmic, emergent, and statistical rather than conscious. Yet the law continues to treat consciousness as a prerequisite for ownership. This conceptual lag produces a gap between reality and regulation. To bridge it, the recommendation is to reconceptualize creativity in functional rather than metaphysical terms. Legislators should recognise that IP protection exists not to honour consciousness but to stimulate innovation and disseminate knowledge. If AI outputs fulfil these purposes, they can justifiably receive protection through human proxies or collective ownership models.

A second major challenge is **institutional incapacity**. Legal and administrative institutions, especially in developing countries, lack the technical expertise to assess AI-generated inventions or artworks. Patent and copyright examiners are trained to evaluate human ingenuity, not algorithmic processes. The opacity of deep-learning models further complicates examination: it is difficult to determine whether an AI output is genuinely novel or merely derivative of its training data. Without interpretive transparency, examiners risk granting protection to plagiarized or unoriginal material. To address this, capacity-building becomes imperative. Governments should establish specialised AI-IP units within patent and copyright offices staffed with technologists, data scientists, and legal scholars. Training programmes, joint workshops with WIPO, and continuous digital-literacy initiatives can ensure that examiners possess the technical competence to evaluate AI outputs rigorously.

A third challenge arises from **accountability and liability**. If an AI system infringes an existing patent or generates defamatory or plagiarized content, who should bear responsibility—the developer, the deployer, the user, or the algorithm itself? Current laws offer no clear answers. The difficulty stems from the absence of foreseeability: machine-learning systems evolve unpredictably, making it difficult to attribute intent. The recommendation here is to retain accountability within the human domain by assigning derivative liability to identifiable actors based on their degree of control. Developers who design models, corporations that commercialise them, and users who direct their functioning should all share layered liability. This approach preserves moral agency within the human sphere while recognising AI's operational autonomy.

The fourth challenge concerns **data governance and ethical legitimacy**. Generative AI systems learn from enormous datasets that often include copyrighted

materials scraped from the internet without consent. This raises questions about fair use, transformative purpose, and data provenance. Inadequate regulation risks violating the rights of original authors and undermining trust in AI creativity. The recommendation is the creation of transparent data-licensing frameworks and mandatory disclosure requirements for training datasets. Jurisdictions such as Japan and Singapore have already introduced limited text-and-data-mining exceptions; India could adapt similar provisions under Section 52 of the Copyright Act by clarifying permissible AI training uses. This would balance innovation incentives with respect for creators' rights.

A fifth challenge is **fragmented international coordination**. The comparative analysis shows that jurisdictions vary widely in their treatment of AI authorship. This divergence generates uncertainty for global enterprises and complicates cross-border enforcement. For instance, an AI-generated artwork may enjoy protection in the U.K. but fall into the public domain in the United States. To address this, India should actively participate in multilateral negotiations under WIPO's "Conversation on AI and IP," advocating a harmonized definition of human control and transparent authorship standards. International cooperation will be essential to prevent forum shopping and regulatory arbitrage in global creative markets.

The sixth challenge pertains to **economic inequality and concentration of technological power**. The development and deployment of generative AI are dominated by a small number of multinational corporations possessing massive computational resources and proprietary datasets. Without corrective policy, IP protection for AI outputs could entrench these monopolies, marginalizing individual creators and small enterprises. The recommendation is to complement IP reform with competition law and open-licensing mechanisms. India could adopt a "compulsory licensing for algorithms" model akin to pharmaceutical patents, requiring dominant AI firms to share foundational models for research and education under fair terms. This would democratize access to technology while preserving incentives for innovation.

The seventh challenge involves **cultural and moral rights**. Many creative works embody cultural heritage, aesthetic traditions, and moral personality. When AI systems replicate such works, they risk eroding cultural authenticity and misappropriating indigenous knowledge. The recommendation is the introduction of sui-generis protection for traditional cultural expressions and community-owned data, ensuring that AI training and outputs respect cultural integrity. This aligns with India's constitutional mandate to protect cultural diversity under Articles 29 and 51A(f).

An eighth challenge is **judicial readiness and interpretive consistency**. Courts in India and elsewhere have only begun to encounter cases involving AI-generated works. Without clear legislative or administrative guidance, judges may apply inconsistent standards, leading to unpredictable outcomes. To mitigate this, the judiciary should develop interpretive guidelines through continuing judicial-education programmes in collaboration with national law universities and technology institutes. The Supreme Court of India could also constitute a *Technology and Law Committee* to issue advisory opinions on AI-related matters, similar to the European Commission's Expert Group on AI and IP.

Another pressing concern is **public awareness and stakeholder participation**. The literature review revealed that treaty negotiations and domestic policymaking on AI and IP have largely occurred behind closed doors. Exclusion of civil society, academic researchers, and creative

communities from these discussions threatens the legitimacy of resulting laws. The recommendation is to institutionalize participatory governance by publishing draft treaties, inviting public consultation, and holding parliamentary hearings. Transparency will ensure that legal reform reflects collective deliberation rather than corporate lobbying.

A further systemic challenge is **technological dynamism**. The speed of AI innovation vastly outpaces legislative cycles. Any statutory amendment risks becoming obsolete before implementation. Hence, the recommendation is to rely on adaptive governance mechanisms such as administrative guidelines, interpretive circulars, and regulatory sandboxes that allow real-time experimentation. For example, the Indian government could pilot an *AI Creativity Regulatory Sandbox* enabling limited recognition of AI-assisted works under controlled conditions, gathering empirical evidence before nationwide rollout.

Finally, the overarching challenge is **maintaining the balance between sovereignty and international obligation**. While India must comply with TRIPS and WIPO norms, it also possesses constitutional discretion to frame policies aligning with national development goals. Over-harmonization could compromise domestic priorities, whereas excessive isolation could alienate global investors. The recommendation is therefore strategic dualism: adhere to international minimum standards while asserting national flexibility through interpretive declarations and soft-law instruments.

In summary, the challenges identified are multifaceted—philosophical, institutional, technological, ethical, and geopolitical. The corresponding recommendations call for a holistic reform programme combining conceptual innovation, institutional strengthening, technological literacy, participatory governance, and international engagement. Implemented together, these measures would enable India to craft an intellectual property regime that is technologically resilient, ethically grounded, and globally competitive in the era of generative artificial intelligence.

Conclusion

The transformation of creativity and innovation in the age of generative artificial intelligence compels an equally transformative response from intellectual property law. The findings of this research affirm that while current legal systems remain anchored in human-centric assumptions, they are being steadily reinterpreted to accommodate algorithmic participation. The relationship between law and technology is therefore dialectical—law resists technological disruption yet gradually reshapes itself under its pressure. The challenge for policymakers, courts, and scholars is to manage this evolution deliberately rather than reactively, ensuring that the balance between innovation and equity is preserved.

The study concludes that the core problem confronting intellectual property regimes is not whether AI can be creative, but how legal systems can recognize and regulate this creativity without undermining the ethical and economic foundations of ownership. The insistence on human authorship, though doctrinally conservative, continues to serve important normative functions: it grounds accountability, maintains moral rights, and ensures that intellectual property remains tethered to human welfare. Yet, a rigid anthropocentrism would misrepresent contemporary reality and stifle innovation. The way forward lies in a hybrid model that attributes authorship and inventorship to humans who exercise meaningful control or supervision over AI systems while acknowledging the algorithm's functional contribution.

For India, this hybrid model aligns naturally with constitutional principles emphasizing reasonableness, proportionality, and social welfare. The Patents Act 1970 and the Copyright Act 1957 possess interpretive elasticity sufficient to accommodate AI-assisted creativity without statutory overhaul. Judicial precedent in India has historically favoured pragmatic and purposive interpretation, allowing adaptation to technological progress. Therefore, incremental reform—through interpretive guidance, administrative circulars, and expert committees—offers a viable pathway toward modernization.

At a global level, India's engagement with WIPO's ongoing discussions on AI and IP will be essential. By contributing to the formulation of international norms on human oversight, data transparency, and algorithmic accountability, India can shape the emerging jurisprudence in ways that reflect both its developmental aspirations and its democratic values. The integration of ethical AI principles—transparency, fairness, and explainability—into IP governance can further ensure that legal modernization aligns with human rights and sustainable development.

Ultimately, the study asserts that intellectual property law must transcend its traditional boundaries and embrace a new philosophy of **distributed creativity**. In this paradigm, innovation arises from networks of human and non-human actors, and law's role is to manage these relationships to promote collective welfare. The recognition of AI-assisted creation should not be seen as a dilution of human creativity but as its amplification through technology. If guided by principles of equity, accountability, and openness, the coexistence of human and machine creativity can usher in an era of unprecedented intellectual prosperity.

The conclusion, therefore, reaffirms the central thesis of this research: that intellectual property law in the age of generative AI should evolve not through abrupt revolution but through adaptive reform grounded in legal continuity and ethical foresight. By reinterpreting the concepts of authorship, inventorship, and originality in light of technological transformation, India can build an IP system that is at once innovative, inclusive, and just.

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