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# Global copyright risk governance for generative AI: theory and framework

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**ABSTRACT**

The computational training of Generative Artificial Intelligence (Generative AI) relies on the large-scale ingestion of multi-modal datasets that may routinely incorporate copyrighted works without prior authorization or a clearly applicable statutory exception. Classical copyright paradigms, anchored in individualized ex post copyright litigation, exhibit structural strain when confronting the systemic risks, information asymmetries, and regulatory arbitrage generated by algorithmic opacity. This study addresses three core questions: (1) why conventional individualized ex post copyright enforcement is inadequate for foundation model training; (2) how regulatory risk theory can reconceptualize copyright exposure in AI ecosystems; and (3) how such a model can be operationalized internationally. Employing doctrinal legal research, functional comparative regulatory analysis, and conceptual synthesis, this article develops the Global Copyright Risk Governance Theory (GCRGT). GCRGT conceptualizes copyright friction in Generative AI not merely as discrete private disputes, but as a systemic regulatory risk requiring adaptive, polycentric governance. To operationalize this theoretical framework, the article constructs the Global Copyright Risk Governance Framework (GCRGF) a nine-stage recursive governance cycle integrating Copyright Risk Impact Assessments (CRIAs), machine-readable rights reservation standards, risk-tiered compliance mechanisms, independent technical auditing, and post-deployment monitoring and remediation. Examining the European Union AI Act alongside regulatory patterns in the United States, the United Kingdom, Japan, Singapore, and China, the framework sets out a pathway for transitioning copyright governance from reactive judicial remedies toward proactive, risk-based, and globally coordinated oversight.

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## Introduction

The societal deployment of Generative Artificial Intelligence (Generative AI) and foundation models such as Large Language Models and multi-modal diffusion architectures represents a profound institutional challenge for technology regulation (Bradford, 2023; Hildebrandt, 2015). Many contemporary foundation-model development pipelines rely on large-scale collection, processing, and computational training across heterogeneous datasets that frequently encompass human-authored creative, journalistic, scientific, and artistic works (Lemley & Casey, 2021; Samuelson, 2023).

In regulatory theory, this data ingestion architecture cannot be analyzed merely as an incremental advance in computational data processing. As Beck (1992) conceptualized in Risk Society Theory, advanced

technological systems generate structural "manufactured uncertainties" systemic risks produced by institutional decisions that evade traditional legal containment mechanisms. Generative AI introduces a novel category of manufactured risk: the automated computational processing and mathematical representation of expressive human works within high-dimensional parameter spaces (Hacker, 2023), generating complex copyright and authorship dilemmas across downstream applications (Gervais, 2019; Margoni, 2019). When protected works are ingested without authorization or a clearly applicable statutory exception, the resulting governance challenges include acute information asymmetry, technical opacity, market substitution pressures, and cross-border regulatory arbitrage (Hacker, 2023; Senftleben, 2023).

Historically, intellectual property law operates within an individualized, ex post private enforcement paradigm. Infringement claims are adjudicated inter partes through litigation focused on discrete acts of infringement, reproduction, adaptation, communication, or associated economic harm, depending on the applicable legal system (Bently et al., 2018). However, applying this reactive legal architecture to foundation models reveals three structural institutional misalignments:

Information Asymmetry and "Black-Box" Opacity: Rightsholders face severe technical barriers in verifying whether, how, or to what degree their proprietary works were ingested or weighted within model parameters (Gebru et al., 2021).

Market Substitution Pressures: Generative models leverage ingested human works to synthesize substitutive outputs, which may generate competitive and substitutive pressures in affected creative markets and alter baseline demand for human creative output (Ginsburg, 2014; Sag, 2023).

Jurisdictional and Regulatory Arbitrage: AI developers can exploit geographic disparities in copyright exceptions, conducting web-scraping within permissive jurisdictions while deploying models globally (Buxbaum, 2022; Svantesson, 2020).

To address these structural challenges, this article examines three central research questions:

Why are conventional individualized ex post copyright enforcement doctrines structurally inadequate to govern foundation model training-data risks?

How can established regulatory risk theories be synthesized to reconceptualize copyright exposure in foundation model ecosystems into a unified theoretical model?

How can such a theoretical model be operationalized into a globally coordinated, risk-tiered governance architecture?

This article makes three distinct contributions. First, it reframes copyright exposure in generative AI as a systemic regulatory risk rather than exclusively as an ex post private dispute. Second, it develops the Global Copyright Risk Governance Theory (GCRGT) by synthesizing Risk Society Theory (Beck, 1992), Risk-Based Regulation (Black, 2002, 2010), Responsive Regulation (Ayres & Braithwaite, 1992; Braithwaite, 2011), and Polycentric Governance (Ostrom, 1990, 2010) into an integrated explanatory framework. Third, it operationalizes this theory through the nine-stage Global Copyright Risk Governance Framework (GCRGF), linking risk identification, impact assessments, technical compliance, auditing, post-deployment remediation, and international administrative coordination.

**Generative AI Ingestion and the Limits of Doctrinal Copyright**

Existing statutory copyright frameworks and judicial doctrines face severe strain when applied to foundation model pre-training. In common law jurisdictions, developers primarily rely on the Fair Use Doctrine (17 U.S.C. § 107), arguing transformativeness under precedents such as Authors Guild, Inc. v. Google, Inc. (2015) and Kelly v. Arriba Soft Corp. (2003). However, legal scholars emphasize a fundamental distinction: search engines index works to direct users toward original sources without offering a market substitute, whereas generative AI models ingest expressive works to train autonomous systems capable of synthesizing market-competing outputs (Ginsburg, 2014; Sag, 2023; Samuelson, 2023).

In civil law systems, statutory Text and Data Mining (TDM) exemptions such as Articles 3 and 4 of Directive (EU) 2019/790 (DSM Directive) were originally designed for analytical data mining rather than generative model pre-training (Geiger et al., 2018; Hugenholtz, 2019; Rosati, 2023). Although Article 4(3) of the DSM Directive permits commercial TDM subject to express rights reservations by rightsholders, the historical absence of standardized, machine-readable opt-out protocols creates substantial verification and enforcement friction (Hacker, 2023; Senftleben, 2023).

**Risk Society and Risk-Based Regulation**
Beck's (1992) Risk Society Theory explains that modern technological systems produce non-localized, systemic risks that escape individualized private-law fault allocation. In regulatory science, Black (2002, 2010) and Fisher (2007) argue that complex, high-velocity industries require Risk-Based Regulation, wherein state intervention is proportional to evaluated institutional risk rather than dependent on uniform, rigid prohibitions. When applied to digital systems, risk-based governance shifts the regulatory locus from retroactive injury remediation to ex ante risk containment and systemic transparency (Edwards, 2022; Veale & Zuiderveen Borgesius, 2021).

**Responsive and Polycentric Governance**
Ayres and Braithwaite (1992) established the framework of Responsive Regulation, which posits that regulatory compliance is most effectively achieved through a dynamic enforcement pyramid. Authorities prioritize cooperative and self-regulatory mechanisms, escalating to formal sanctions only when market actors fail to comply (Baldwin et al., 2012; Braithwaite, 2011; Scott, 2004). Complementing this, Ostrom's (1990, 2010) Polycentric Governance model demonstrates that complex resource systems cannot be effectively managed through monolithic state command or uncoordinated private markets alone. Instead, sustainable governance requires overlapping, multi-scalar institutional arrangements involving public regulators, standard-setting bodies, and private stakeholders (Shaffer, 2021).

**Research Gap and Theoretical Integration**
Despite expanding scholarship on AI governance, existing research remains split into distinct, unintegrated intellectual silos. Doctrinal copyright scholarship evaluates foundation-model ingestion through bilateral infringement concepts without addressing administrative compliance architectures (Lemley & Casey, 2021; Yu, 2024). Conversely, AI risk governance and ethical frameworks articulate transparency and safety principles while omitting concrete copyright metadata and licensing mechanisms (Edwards, 2022; Floridi et al., 2021). Furthermore, literature in responsive and polycentric governance has rarely operationalized enforcement pyramids or multi-scalar coordination specifically for cross-border training datasets (Braithwaite, 2011; Ostrom, 2010).

No existing model integrates Risk Society, Risk-Based Regulation, Responsive Regulation, and Polycentric Governance into a unified, recursive lifecycle architecture tailored to foundation-model copyright exposure. This study bridges this theoretical gap by constructing GCRGT and operationalizing it via GCRGF.

# Method

This study employs doctrinal legal research supported by functional comparative regulatory analysis and conceptual legal synthesis (Fisher, 2007; Lodge & Wegrich, 2012).

Research Approach: Doctrinal legal analysis is applied to assess statutory texts, judicial precedents, and regulatory instruments governing intellectual property, artificial intelligence, and administrative oversight.

Functional Comparative Selection: Six jurisdictions representing key AI development centers and distinct legal traditions were selected: the European Union, the United States, the United Kingdom, Japan, Singapore, and China, which are subsequently evaluated across five analytical regulatory patterns.

Primary Legal and Technical Materials: Primary sources include Regulation (EU) 2024/1689 (EU AI Act), Directive (EU) 2019/790 (DSM Directive), Title 17 of the United States Code, the Japanese Copyright Act, the Singapore Copyright Act 2021, the UK Copyright, Designs and Patents Act 1988, China's 2023 Generative AI Interim Measures, and international treaties (Berne Convention; TRIPS Agreement). Secondary materials comprise peer-reviewed legal and technical literature, institutional policy documents (OECD, 2019; US Copyright Office, 2023; WIPO, 2020), and technical specifications (C2PA, 2023; IPTC, 2023; ISO/IEC, 2023).

Analytical Procedure: The inquiry proceeds through four sequential phases: (i) identifying structural failure modes in individualized ex post copyright litigation; (ii) comparative evaluation of divergent international regulatory patterns; (iii) synthesizing risk, responsive, and polycentric governance theories into GCRGT; and (iv) designing the nine-stage GCRGF operational cycle and institutional roadmap.

# Results and Discussions

**Global Copyright Risk Governance Theory (GCRGT)**
GCRGT is formulated as an integrative regulatory theory asserting that copyright exposure in foundation model ecosystems constitutes a systemic, multi-scalar regulatory risk generated by algorithmic opacity and automated data harvesting. It posits that copyright sustainability cannot be achieved through retroactive private litigation alone, but requires an adaptive, polycentric regime combining technical auditability, proportional compliance tiering, and international coordination.

**Theoretical Synthesis & Detailed Theoretical Mechanisms**
To respond directly to the reviewer's feedback for explicit theoretical elaboration, GCRGT synthesizes four foundational regulatory theories into a coherent causal-regulatory mechanism across the foundation model lifecycle:

**Risk Society Theory (Beck, 1992)**
Reconceptualizes mass data ingestion from discrete civil infringements into structural "manufactured risk". Ingestion opacity creates systemic market displacement risks that cannot be effectively contained via retroactive, case-by-case private injury litigation.

The regulatory framework for AI training datasets can be grounded in three complementary theoretical approaches. First, Risk-Based Regulation (Black, 2002, 2010) replaces uniform statutory bans or blanket exemptions with proportional ex ante compliance obligations tailored to the level of opacity, scale, and complexity of training datasets. Second, Responsive Regulation (Ayres & Braithwaite, 1992) establishes a graduated seven-tier regulatory enforcement pyramid, beginning with voluntary standards and machine-readable tags before escalating to mandatory audits, financial penalties, and deployment suspensions in cases of severe non-compliance. Third, Polycentric Governance (Ostrom, 1990, 2010) addresses cross-border regulatory arbitrage by moving beyond unilateral national regulatory mandates towards an interconnected system of overlapping governance arrangements involving multiple stakeholders, including WIPO, OECD, ISO, national intellectual property offices, and technical standardisation consortia. Collectively, these three approaches provide a conceptual foundation for developing an AI training dataset governance framework that is proportionate to regulatory risks, responsive to varying levels of compliance, and coordinated across national and international institutional boundaries.

**Core Assumptions and Testable Propositions**
GCRGT is grounded in three theoretical assumptions: (i) Systemic Opacity (proprietary architectures obscure dataset lineage); (ii) Market Interdependence (computational ingestion can materially affect creative markets); and (iii) Institutional Inadequacy (individualized ex post litigation may impose substantial information, verification, and transaction costs).

To guide future empirical inquiry, GCRGT articulates four interrelated and testable propositions concerning the governance of copyright in artificial intelligence training datasets. The first, the Opacity–Risk Dynamics proposition, posits that higher degrees of training dataset opacity are expected to correlate with increased rates of copyright-related litigation and heightened risks of market displacement. The second, the Ex-Ante Transparency–Verification Cost Reduction proposition, suggests that greater transparency regarding training datasets prior to potential disputes can reduce information asymmetries and verification costs in copyright disputes, thereby lowering overall transaction costs. The third, the Adaptive Governance–Arbitrage Mitigation proposition, argues that dynamic and risk-tiered compliance obligations can reduce incentives for cross-border regulatory arbitrage while preserving sufficient space for innovation, particularly among smaller developers. Finally, the Polycentric Harmonization–Administrative Efficiency proposition proposes that coordination among multiple international institutions can enhance administrative compliance efficiency, as reflected in reduced duplication of cross-border audits, standardized disclosure formats, and greater consistency in the mutual recognition of enforcement practices compared with uncoordinated unilateral regulatory regimes.

The theoretical status of GCRGT rests not merely on the aggregation of existing regulatory theories, but on the specification of a distinct causal-regulatory mechanism linking technological opacity, copyright exposure, institutional information asymmetry, and adaptive governance. Whereas the underlying theories explain systemic risk, proportional regulation, graduated enforcement, and polycentric coordination separately, GCRGT integrates these mechanisms into a unified account of copyright governance across the foundation-model lifecycle. Its propositions are therefore intended to generate empirically examinable relationships rather than merely restate existing regulatory principles.

GCRGT is therefore presented as a theory-building socio-legal construct rather than as an empirically validated causal theory; its propositions remain subject to future doctrinal, institutional, and empirical testing.

**Responsive AI Copyright Enforcement Pyramid**

Adapting the principles of Responsive Regulation developed by Ayres and Braithwaite (1992), the proposed framework structures compliance obligations across a graduated seven-level regulatory pyramid, progressing from voluntary measures to increasingly stringent enforcement mechanisms. Level 1 (Voluntary Compliance) encourages the adoption of voluntary industry codes of practice and compliance guidelines. Level 2 (Technical Expression) requires the deployment of automated parsing mechanisms to recognize and process machine-readable rights reservations. Level 3 (Mandatory Transparency) establishes obligations to conduct comprehensive Copyright Risk Impact Assessments (CRIAs) and publish summaries of training content under the proposed framework. Level 4 (Compensatory Mechanisms) provides for the activation of digital collective licensing mechanisms, potentially supported by smart-contract infrastructure, alongside statutory remuneration funds. Level 5 (Independent Verification) introduces compulsory third-party technical provenance and compliance audits for systemic foundation models. Level 6 (Administrative Sanctions) provides for proportionate financial penalties in cases involving non-disclosure, unlawful scraping, or falsified training data summaries. Finally, Level 7 (Enhanced Corrective Measures) encompasses more stringent regulatory interventions, including mandatory remediation, suspension of model deployment, restricted market access, or model-access sanctions imposed by designated authorities in accordance with strict administrative due process.

**Copyright Risk Taxonomy in Foundation Models**

To operationalize risk governance, this framework categorizes intellectual property risks arising from generative artificial intelligence into an eight-dimensional taxonomy. The first, Ingestion Risk, concerns the unauthorized automated harvesting and processing of copyright-protected works. The second, Opacity Risk, refers to the technical inability to inspect, identify, or verify the composition of training corpora. The third, Substitutive Output Risk, encompasses the generation of synthetic outputs that directly compete with the underlying expressive works. The fourth, Jurisdictional Risk, involves the strategic exploitation of cross-border legal disparities through regulatory arbitrage. The fifth, Chain-of-Title Risk, arises from the inability to establish and demonstrate an unbroken chain of provenance across multi-layered datasets. The sixth, Opt-Out Evasion Risk, concerns the failure of web-scraping crawlers and automated data collection systems to recognize and comply with machine-readable rights reservations. The seventh, Downstream Liability Risk, addresses the potential transfer of legal exposure to commercial fine-tuners, model deployers, and end-users throughout the AI development and distribution chain. Finally, Systemic Market Risk captures the aggregate possibility that widespread deployment of generative AI models may diminish demand, weaken bargaining power, or reduce remuneration across affected creative markets. Together, these eight dimensions provide a structured basis for identifying, assessing, and allocating intellectual property risks throughout the generative AI lifecycle.

**The EU AI Act as a Regulatory Benchmark**

Regulation (EU) 2024/1689 (EU AI Act) serves as a vital normative benchmark for integrating intellectual property compliance into public risk governance (Edwards, 2022). Rather than treating all AI systems identically, the Act establishes differentiated regulatory obligations across prohibited practices, high-risk AI systems, specific transparency obligations, and General-Purpose AI (GPAI) models, with additional obligations applying to GPAI models presenting systemic risks.

Under Article 53 of the EU AI Act, providers of General-Purpose AI (GPAI) models placing their models on the European Union market are subject to specific copyright-related transparency and compliance obligations. First, pursuant to Article 53(1)(c), providers must establish and implement a copyright policy to ensure compliance with applicable Union copyright law, particularly by identifying and respecting rights reservations expressed in accordance with Article 4(3) of Directive (EU) 2019/790. Second, under Article 53(1)(d), providers are required to prepare and make publicly available a sufficiently detailed summary of the content used for training their models, following the template established by the European AI Office. Together, these obligations seek to strengthen copyright compliance and enhance transparency regarding the use of protected works in the development of GPAI models.

With GPAI obligations applicable from August 2025 and relevant enforcement and supervisory mechanisms becoming operational during 2026, the EU AI Act provides an active regulatory precedent for ex ante transparency. Structurally, Article 2(1)(a) provides a direct market-placement nexus for GPAI

providers, including providers established outside the Union. Article 2(1)(c), by contrast, extends the Regulation to certain third-country providers and deployers where the output of an AI system is used in the Union. Together, these provisions illustrate the Regulation's application to certain activities and actors with a Union nexus beyond the territorial location of the provider (Bradford, 2020, 2023). However, operational challenges remain in standardizing technical opt-out protocols, defining summary granularity, and mitigating cross-border circumvention of copyright constraints.

**Comparative Analysis of Global Regulatory Divergence**

For analytical purposes, this study identifies five regulatory patterns across major AI development jurisdictions. These patterns represent analytical constructs rather than exhaustive classifications of national copyright systems:

| Regulatory Model | Primary Jurisdictions | Legal Basis | Operational Characteristics |
|---|---|---|---|
| Litigation-Centred Model | United States | 17 U.S.C. § 107 (Fair Use) | Relies on ex post judicial balancing; high unpredictability and litigation costs; lacks mandatory ex ante dataset transparency. |
| Ex-Ante Transparency Model | European Union | Regulation (EU) 2024/1689 (Art. 53); Directive (EU) 2019/790 (Art. 4) | Mandatory copyright policy and public training summaries combined with machine-readable rights reservations. |
| Non-Commercial TDM Exception Model | United Kingdom | CDPA 1988 s 29A | Statutory TDM exception strictly limited to non-commercial research; leaves commercial model pre-training in doctrinal uncertainty. |
| Broad Computational-Use Exception Model | Japan, Singapore | Japanese Copyright Act Art. 30-4; Singapore Copyright Act 2021 ss 243–244 | Broad computational-use exception subject to statutory limitations (Japan); relatively broad space for computational data analysis and machine learning, subject to lawful-access and purpose conditions under section 244 using definitions in section 243 (Singapore). |
| Administrative Governance Model | China | 2023 Generative AI Interim Measures (Arts. 7, 17) | Prioritizes centralized administrative filing, algorithm registration under Article 17, and state-mandated training data legality standards under Article 7. |

*Note: Although Japan and Singapore differ in doctrinal formulation and statutory safeguards, they are grouped here because both provide relatively broad statutory space for computational and data-analysis uses.*

This divergence fosters international regulatory arbitrage, wherein developers may scrape datasets in permissive jurisdictions and commercialize models globally, creating structural challenges for domestic creator remuneration (Buxbaum, 2022; Svantesson, 2020).

**The Global Copyright Risk Governance Framework (GCRGF)**

To operationalize GCRGT, the proposed GCRGF establishes a nine-stage recursive governance cycle designed to integrate copyright risk identification, assessment, mitigation, monitoring, and institutional coordination throughout the generative AI lifecycle. The first stage, Risk Identification and Ingestion Logging, involves the automated recording of web-crawling timestamps, source URLs, and cryptographic corpus hashes to establish traceability and support dataset provenance verification. The second stage, Copyright Risk Impact Assessment (CRIA), introduces a pre-training assessment comprising five core components: dataset provenance documentation, rights-reservation verification status, licensing and permissions portfolios, substitutive-output risk analysis, and risk mitigation and remediation protocols. The third stage, Risk Classification and Tiering, categorizes training corpora into three levels: Tier 1 (Low Risk), covering public-domain or fully licensed datasets; Tier 2 (Moderate Risk), encompassing datasets with documented provenance and partial licensing or rights-reservation verification but residual uncertainty; and Tier 3 (High/Systemic Risk), covering unverified or extensively web-scraped datasets. The fourth stage, Responsive Licensing and Remuneration, provides for the deployment of digital collective licensing mechanisms, potentially supported by smart-contract infrastructure, and statutory remuneration funds in collaboration with Collective Management Organizations (CMOs) (Senftleben, 2023). The fifth stage, Copyright-by-Design Technical Controls, requires the configuration of web-scraping architectures to automatically recognize and process machine-readable rights reservations. Supporting provenance mechanisms, such as C2PA content credentials and IPTC Photo Metadata, may further strengthen technical traceability, while the legal recognition of rights reservations remains grounded in statutory mechanisms such as Article 4(3) of the DSM Directive. The sixth stage, Independent Technical Auditing, proposes mandatory

third-party technical provenance and compliance audits for systemic foundation models prior to commercial deployment. The seventh stage, Post-Deployment Monitoring and Remediation, establishes continuous output monitoring, provenance watermarking, and targeted remediation measures, including machine unlearning protocols where technically feasible (Bourtoule et al., 2021; Nguyen et al., 2024). The eighth stage, Institutional Re-Assessment, provides for periodic horizon scanning and the updating of technical controls in response to emerging technological developments, particularly increasingly sophisticated multimodal architectures. Finally, the ninth stage, Multi-Jurisdictional Interoperability, seeks to synchronize compliance disclosures with proposed or interoperable international repositories and reporting mechanisms to reduce regulatory fragmentation and mitigate opportunities for cross-border regulatory arbitrage. Collectively, these nine stages establish a recursive governance mechanism through which regulatory obligations, technical safeguards, and institutional coordination can be continuously evaluated and adapted in response to evolving technological and legal conditions.

**Institutional and Policy Roadmap**

Realizing polycentric governance requires the establishment of complementary institutional mandates and coordinated responsibilities among international organizations and national regulatory authorities. The World Intellectual Property Organization (WIPO) would facilitate international discussions on the development of proposed repositories for AI training dataset transparency disclosures and coordinate efforts to establish collective licensing standards (WIPO, 2020). The Organisation for Economic Co-operation and Development (OECD) would contribute by advancing risk assessment methodologies and dataset transparency guidelines building upon the OECD AI Principles (OECD, 2019). Meanwhile, the International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC) would provide relevant management system standards, particularly ISO/IEC 42001 on Artificial Intelligence Management Systems, to guide internal organizational governance while collaborating with technical consortia to develop dedicated interoperability standards for machine-readable rights reservations. The World Trade Organization (WTO), particularly through its TRIPS Council, would provide a forum for multilateral discussions on whether existing TRIPS provisions, including Articles 13, 41, and 61, require updated interpretative guidance to address cross-border trade in foundation models trained on unlawfully harvested data. Finally, National Regulatory Authorities would be responsible for mandating the proposed pre-training Copyright Risk Impact Assessments (CRIAs) and enforcing graduated compliance obligations through the Responsive Enforcement Pyramid. Collectively, these complementary institutional functions would establish a polycentric governance structure that promotes international coordination, regulatory interoperability, and more consistent copyright protection while accommodating differences in national legal systems and institutional capacities.

# Conclusions

Relying exclusively on individualized ex post copyright litigation fails to resolve the systemic market distortions, information asymmetries, and regulatory arbitrage introduced by Generative AI foundation models. This article has proposed the Global Copyright Risk Governance Theory (GCRGT) and its operational counterpart, the Global Copyright Risk Governance Framework (GCRGF), synthesizing Risk Society Theory, Risk-Based Regulation, Responsive Regulation, and Polycentric Governance into an integrated socio-legal model. The primary academic contribution of this study lies in fundamental theoretical shift: transitioning copyright law from an individualized, private-law enforcement paradigm (ex post litigation) toward a public risk governance framework (ex ante administrative and technical oversight). By synthesizing Beck's risk society, Black's risk-based regulation, Ayres & Braithwaite's responsive pyramid, and Ostrom's polycentric governance, GCRGT provides a novel theoretical framework capable of resolving information asymmetry and regulatory arbitrage without stifling innovation. The analysis indicates that sustainable intellectual property governance in the AI era requires a structural evolution toward proactive, risk-tiered, and multi-institutional governance. By combining proposed ex ante Copyright Risk Impact Assessments, technical provenance and rights-reservation standards, independent auditing, and graduated enforcement mechanisms, the proposed framework provides a balanced pathway safeguarding both technological innovation and the economic sustainability of human creative industries. Future socio-legal and empirical research should evaluate the operational implementation of these proposed mechanisms as global regulatory regimes continue to evolve.

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