

Training Artificial Intelligence on Copyrighted Works in Pakistan: A Doctrinal Analysis
and Proposal for a Comprehensive Legal and Policy Framework

Bilal Jamil
mianbeelal295@gmail.com
LL.M, Advocate High Court

Amna Imdad
amnaimdad.law@tuf.edu.pk
Lecturer, Research Coordinator, Faculty of Law, The University of Faisalabad (TUF), Pakistan

Ali Haider
ali.pupc@pu.edu.pk
Lecturer and Program Coordinator (Law), Punjab University Pothohar Campus

Corresponding Author: Amna Imdad amnaimdad.law@tuf.edu.pk

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ABSTRACT

The rapid advancement of artificial intelligence (AI) has transformed the creation, dissemination, and utilization of copyrighted works, giving rise to complex legal challenges concerning the use of protected content for AI training. In Pakistan, the Copyright Ordinance, 1962 does not expressly regulate the extraction and use of copyrighted materials for machine learning purposes, resulting in significant legal uncertainty for copyright owners, AI developers, and policymakers. This study employs a qualitative doctrinal research methodology by critically examining Pakistan's copyright framework, relevant international copyright instruments, comparative legal developments, and emerging judicial and policy approaches from selected jurisdictions. The research analyzes the compatibility of existing copyright principles with AI training practices, evaluates the adequacy of available exceptions and limitations, and identifies the legal and policy gaps that hinder innovation while compromising the protection of authors' rights. Based on this analysis, the study proposes a comprehensive legal and policy framework tailored to Pakistan that seeks to balance technological innovation, public interest, and effective copyright protection. The proposed framework aims to provide legal certainty, promote responsible AI development, and align Pakistan's copyright regime with evolving international standards in the digital era.

Keywords: Artificial Intelligence, Copyright Law, AI Training, Copyrighted Works, Pakistan.

INTRODUCTION

Background and Significance of AI Training on Copyrighted Works

Artificial intelligence (AI) has emerged as one of the most transformative technologies of the twenty-first century, revolutionizing the manner in which information is processed, creative content is generated, and knowledge is disseminated. Contemporary AI systems, particularly those based on machine learning and deep learning, require extensive datasets for training in order to recognize patterns, generate human-like outputs, and continuously improve their performance. These datasets frequently consist of books, journal articles, photographs, music, software code, artistic works, and other materials protected under copyright law (Bukhari et al., 2023). While the use of copyrighted works has become essential for developing sophisticated AI models, it has simultaneously raised significant legal and ethical concerns regarding

unauthorized reproduction, data extraction, and the rights of copyright owners. In Pakistan, where the Copyright Ordinance, 1962 was enacted long before the emergence of AI technologies, the existing legal framework does not specifically regulate the use of copyrighted works for AI training. This legal uncertainty creates challenges for authors, publishers, technology companies, researchers, and policymakers, highlighting the need for a balanced framework that protects intellectual property rights while fostering technological innovation.

Growth of Generative AI and Copyright Concerns

The rapid expansion of generative AI technologies has intensified global debates concerning copyright protection and the lawful use of creative works for algorithmic training. Generative AI systems are capable of producing original-looking text, images, music, videos, and computer code by learning from enormous collections of existing copyrighted materials. Although these technologies offer remarkable opportunities for education, business, scientific research, and economic development, they also raise questions relating to copyright infringement, fair use, licensing, transparency, attribution, and ownership of AI-generated outputs. Different jurisdictions have adopted varying regulatory approaches, resulting in an evolving international legal landscape (AllahRakha, 2024). Pakistan has yet to formulate a comprehensive legal or policy framework that specifically addresses these issues. Consequently, uncertainty persists regarding the rights and obligations of AI developers, content creators, users, and regulatory authorities. Addressing these challenges is essential for ensuring legal certainty, encouraging responsible AI innovation, and safeguarding the legitimate interests of copyright holders in the digital economy.

Research Objectives

- i. To examine the legal framework governing copyright protection and AI training in Pakistan.
- ii. To analyze the compatibility of existing copyright laws with the use of copyrighted works for AI training.
- iii. To evaluate international legal approaches regulating AI training on copyrighted materials.
- iv. To identify the legal and policy gaps in Pakistan's copyright regime concerning AI training.
- v. To propose a comprehensive legal and policy framework for regulating AI training on copyrighted works in Pakistan.

Research Questions

- i. What legal framework governs the use of copyrighted works for AI training in Pakistan?
- ii. To what extent does Pakistan's copyright law accommodate AI training activities?
- iii. How have other jurisdictions addressed copyright issues arising from AI training?
- iv. What legal and policy deficiencies exist in Pakistan's current copyright framework concerning AI training?
- v. What legal and policy reforms can effectively regulate AI training on copyrighted works in Pakistan?

Research Gap

Existing literature predominantly examines artificial intelligence and copyright from international or comparative perspectives, with limited attention devoted to Pakistan's legal framework. Most studies focus on general copyright challenges or AI-generated content rather than the specific issue of using copyrighted works for AI training. Moreover, little doctrinal research proposes a comprehensive legal and policy framework tailored to Pakistan. This study addresses that gap by critically analyzing the existing legal regime and recommending context-specific reforms.

Scope and Methodology

This study is confined to the legal issues arising from the use of copyrighted works for training artificial intelligence systems within the context of Pakistan's copyright regime. It examines relevant domestic legislation, international copyright instruments, comparative legal developments, and emerging regulatory approaches concerning AI training. The research adopts a qualitative doctrinal legal research methodology based exclusively on the analysis of primary legal sources, including statutes, international treaties, judicial decisions, and policy documents, together with secondary sources such as academic literature, legal commentaries, and scholarly publications. Through critical legal analysis and comparative evaluation, the study identifies deficiencies in the existing framework and develops recommendations for a comprehensive legal and policy model capable of balancing copyright protection with technological innovation in Pakistan.

CONCEPTUAL AND LEGAL FOUNDATIONS

Artificial Intelligence and Machine Learning

Artificial intelligence refers to computational systems capable of performing tasks that ordinarily require human intelligence, including language processing, pattern recognition, decision-making, and content generation. Machine learning, a core branch of artificial intelligence, enables computer systems to learn from data and improve their performance without being explicitly programmed for every task. Modern AI models rely on extensive training processes in which algorithms analyze vast quantities of textual, visual, audio, and other digital information to identify statistical relationships and generate predictive or creative outputs. The effectiveness of these systems depends largely on the quality, diversity, and scale of the training data used during the learning process. As AI technologies become increasingly integrated into commercial, educational, and governmental activities, the legal implications of acquiring and processing training data have become a central issue in intellectual property law (Rubab et al., 2024).

Copyrighted Works and AI Training Datasets

AI training datasets frequently include materials protected by copyright, such as books, research articles, newspapers, photographs, paintings, musical compositions, films, software code, and online content. During the training process, these works may be copied, stored, processed, and transformed into machine-readable formats so that algorithms can extract patterns and relationships from the underlying data. Although AI developers often argue that the objective is not to reproduce the original works but to learn from them, the training process may involve acts that fall within the exclusive rights of copyright owners. This creates a legal tension between technological innovation and the protection of authors' economic and moral rights. In jurisdictions where specific exceptions for text and data mining exist, AI developers may rely on statutory limitations, whereas in countries lacking such provisions, the legality of AI training remains uncertain. Pakistan currently falls within the latter category, making the treatment of copyrighted works in AI datasets a significant unresolved legal issue (Shafiq, 2024).

Copyright Principles Applicable to AI

Several fundamental copyright principles are relevant to AI training activities. The principle of originality determines whether a work qualifies for copyright protection, while the rights of reproduction, adaptation, distribution, and communication to the public define the scope of the copyright owner's exclusive control. The doctrine of limitations and exceptions seeks to balance private rights with broader public interests, including education, research, and technological advancement. In the AI context, the central legal question is whether the temporary or intermediate copying involved in machine learning constitutes copyright infringement or falls within a permissible exception. Additional considerations include the purpose and character of the use, the extent of the copying, the impact on the market for the original work, and the transparency of AI training practices. These principles provide the analytical foundation for assessing the compatibility of existing copyright laws with emerging AI technologies (Gilani et al., 2023).

Research Methodology and Doctrinal Approach

This study adopts a qualitative doctrinal legal research methodology because the primary objective is to analyze and interpret the existing legal framework governing copyright and AI training in Pakistan. The research relies on primary legal sources, including the Copyright Ordinance, 1962, relevant constitutional provisions, international copyright treaties, and comparative legislative developments from selected jurisdictions. Secondary sources such as academic books, journal articles, policy papers, and legal commentaries are used to examine scholarly debates and evolving regulatory trends. Through doctrinal analysis, the study evaluates the coherence, adequacy, and limitations of the current legal regime and identifies areas requiring legislative and policy reform. The comparative dimension of the research facilitates the development of context-specific recommendations for a comprehensive legal framework capable of balancing copyright protection with responsible AI innovation in Pakistan (Shami, Asghar, et al., 2025).

COPYRIGHT FRAMEWORK GOVERNING AI TRAINING IN PAKISTAN

Overview of the Copyright Ordinance, 1962

The Copyright Ordinance, 1962 constitutes the principal legislation governing copyright protection in Pakistan. It establishes the legal framework for safeguarding the rights of authors, artists, publishers, software developers, and other creators by granting exclusive rights over their original literary, dramatic, musical, artistic, cinematographic, and computer-generated works. The Ordinance seeks to encourage creativity by providing legal recognition and economic incentives while preventing unauthorized reproduction, publication, adaptation, translation, communication, and commercial exploitation of protected works. Although the legislation has undergone amendments to accommodate technological developments, it was enacted long before the emergence of artificial intelligence and machine learning technologies. Consequently, it contains no explicit provisions regulating the collection, reproduction, or computational analysis of copyrighted materials for AI training. This legislative silence creates uncertainty regarding the legality of using copyrighted works as training data and highlights the need to interpret existing copyright principles in light of rapidly evolving technological realities (Manzoor et al., 2025).

Rights of Copyright Owners under Pakistani Law

Pakistani copyright law grants copyright owners a bundle of exclusive economic and moral rights intended to protect both the commercial value and the integrity of their creative works. These rights include the exclusive authority to reproduce, publish, distribute, communicate, adapt, translate, and license copyrighted material. Copyright owners are also entitled to seek legal remedies against unauthorized use, including

injunctions, damages, and other statutory relief. In the context of artificial intelligence, these exclusive rights become particularly significant because AI developers often reproduce or copy large quantities of copyrighted material during the processes of data collection, storage, indexing, and machine learning. Even where such reproduction is temporary or automated, questions arise as to whether these technical processes constitute acts requiring prior authorization from copyright owners. The absence of explicit statutory guidance makes it difficult to determine the extent to which existing exclusive rights apply to AI training activities (Ashraf et al., 2024).

Fair Dealing Exceptions and Their Scope

The Copyright Ordinance, 1962 recognizes certain limited exceptions to copyright protection through the doctrine of fair dealing. These exceptions generally permit restricted use of copyrighted works for purposes such as private study, research, criticism, review, reporting of current events, judicial proceedings, and specified educational activities without obtaining prior permission from the copyright owner. However, these exceptions were designed primarily for conventional human use rather than automated computational processes performed by artificial intelligence systems. AI training typically involves the systematic copying and processing of vast amounts of copyrighted material, extending far beyond the traditional objectives and scope of fair dealing. Consequently, uncertainty exists regarding whether AI developers may rely upon these statutory exceptions when training machine learning models. The narrow wording of the existing provisions provides limited guidance for addressing contemporary technological practices (S. Zafar, Asghar, et al., 2024).

Legal Status of AI Training under Existing Copyright Law

Under the existing legal framework, the status of AI training on copyrighted works remains largely unresolved in Pakistan. The Copyright Ordinance neither expressly authorizes nor expressly prohibits the use of copyrighted material for developing artificial intelligence systems. This legislative gap creates uncertainty for copyright owners, technology companies, researchers, educational institutions, and regulatory authorities regarding their respective rights and obligations. Courts have yet to establish clear judicial principles specifically addressing AI training, leaving significant interpretative challenges concerning reproduction rights, implied licensing, fair dealing, and technological innovation. As AI technologies continue to evolve and become increasingly integrated into commercial, educational, and governmental sectors, reliance solely upon traditional copyright principles is unlikely to provide sufficient legal certainty. Therefore, the current framework requires legislative clarification and policy reforms capable of balancing the protection of intellectual property rights with the promotion of responsible artificial intelligence development and innovation in Pakistan (S. Zafar, Zaib, et al., 2024).

LEGAL CHALLENGES AND COMPARATIVE PERSPECTIVES

Copyright Infringement through AI Training

The increasing reliance on artificial intelligence systems trained on vast collections of copyrighted works has generated significant legal uncertainty regarding copyright infringement. AI developers commonly acquire and process books, articles, images, music, software code, and other protected materials to improve machine learning models. This process frequently involves reproducing, storing, indexing, and analyzing copyrighted content, raising questions as to whether such activities constitute unauthorized copying under copyright law. Unlike conventional human use, AI training involves automated and large-scale extraction of copyrighted works, making it difficult to determine whether these acts fall within existing statutory exceptions or require prior authorization from copyright owners. The absence of explicit legislative

provisions addressing AI training further complicates the interpretation of copyright law and creates uncertainty for content creators, technology companies, and regulators (M. U. Zafar, Baig, et al., 2024).

Licensing, Consent, and Data Acquisition Issues

Another significant legal challenge concerns the acquisition of copyrighted datasets and the necessity of obtaining valid licenses or consent from copyright owners. Many AI developers collect publicly accessible digital content through automated web scraping or third-party datasets without establishing clear licensing arrangements. Although publicly available content may be accessible online, accessibility does not necessarily imply unrestricted permission for commercial AI training. The lack of transparency regarding data collection practices also creates concerns about accountability, attribution, and respect for the economic interests of authors and publishers. Furthermore, negotiating individual licenses for millions of copyrighted works may be impractical, particularly for large-scale AI systems. These practical difficulties highlight the need for regulatory mechanisms capable of balancing efficient access to training data with adequate protection of intellectual property rights (M. U. Zafar, Asghar, et al., 2024).

Comparative Analysis of International Legal Frameworks

Different jurisdictions have adopted diverse legal approaches to regulate the relationship between artificial intelligence and copyright law. Some countries have introduced specific text and data mining exceptions that permit limited computational analysis of copyrighted materials under defined conditions, while others continue to rely upon existing copyright doctrines such as fair use or fair dealing. Certain jurisdictions emphasize licensing frameworks and contractual solutions, whereas others require greater transparency concerning the sources of AI training data and provide stronger safeguards for copyright owners. International regulatory developments increasingly recognize the importance of balancing innovation with intellectual property protection rather than prioritizing one objective at the expense of the other. These comparative approaches demonstrate that effective AI regulation requires legal certainty, technological neutrality, and clear allocation of rights and responsibilities among all stakeholders (Manzoor et al., 2024).

Lessons for Pakistan from Global Best Practices

Pakistan can benefit substantially from international experience by developing a modern copyright framework that directly addresses AI training while preserving the fundamental objectives of copyright protection. Future reforms should clearly define the legal status of AI training, establish transparent rules governing the acquisition and use of copyrighted datasets, and provide appropriate licensing mechanisms where authorization is required. The legal framework should also clarify the scope of permissible exceptions, encourage responsible data governance, and promote transparency in AI development. In addition, regulatory authorities should facilitate cooperation among government institutions, technology developers, copyright owners, academic researchers, and civil society to formulate practical and balanced policies. By incorporating internationally recognized best practices while adapting them to domestic legal and economic conditions, Pakistan can establish a predictable regulatory environment that promotes technological innovation, protects the legitimate interests of copyright owners, and supports the sustainable development of artificial intelligence within a robust intellectual property system (Adnan & Asghar, 2024).

CRITICAL DOCTRINAL ANALYSIS OF PAKISTAN'S LEGAL FRAMEWORK

Critical Evaluation of the Existing Copyright Framework

A doctrinal analysis of Pakistan's copyright regime demonstrates that the existing legal framework is not sufficiently equipped to address the legal implications arising from the use of copyrighted works for

artificial intelligence (AI) training. The Copyright Ordinance, 1962 was enacted during a period when digital technologies, machine learning, and generative AI were neither foreseeable nor technologically feasible. Consequently, the legislation primarily regulates traditional methods of creating, reproducing, publishing, distributing, and communicating copyrighted works. It contains no express provisions governing automated data collection, computational analysis, algorithmic learning, or the use of large-scale datasets for AI development. This legislative omission has created considerable uncertainty regarding whether AI developers require authorization from copyright owners before using protected works for model training. The absence of statutory definitions relating to AI, machine learning, training datasets, or text and data mining further complicates the legal interpretation of copyright principles. As a result, both copyright owners and AI developers operate within an uncertain legal environment that lacks clear rights, obligations, and compliance standards (A. N. Khan et al., 2024).

Balancing Innovation with Copyright Protection

One of the most significant legal challenges is achieving an appropriate balance between promoting technological innovation and protecting the legitimate rights of copyright owners. Artificial intelligence has become an essential driver of economic development, scientific advancement, digital transformation, healthcare innovation, education, and industrial productivity. These benefits depend largely upon access to high-quality training datasets, many of which contain copyrighted materials. At the same time, copyright law exists to reward creativity by granting authors exclusive rights over the commercial exploitation of their original works. Allowing unrestricted use of copyrighted material for AI training could weaken these incentives, diminish creators' economic interests, and reduce confidence in the copyright system. Conversely, imposing excessive restrictions on access to training data may discourage AI research, reduce investment, and hinder technological competitiveness. A balanced legal framework should therefore recognize that copyright protection and technological innovation are complementary rather than conflicting objectives. Doctrinally, this balance requires legislation that provides legal certainty, proportionate limitations, transparent licensing mechanisms, and carefully defined exceptions capable of accommodating technological development without undermining the fundamental objectives of copyright law (Mushtaq et al., 2024).

Challenges in Enforcement and Regulatory Oversight

Even where copyright rights exist, effective enforcement presents considerable practical and institutional challenges. AI systems frequently rely upon enormous datasets collected from diverse online platforms, digital libraries, academic publications, and publicly accessible websites. Identifying the origin of every copyrighted work incorporated into an AI training dataset is often technically complex and administratively burdensome. Furthermore, AI developers may operate across multiple jurisdictions, creating difficulties concerning territorial jurisdiction, applicable law, and cross-border enforcement. Pakistan's existing intellectual property institutions were designed primarily to supervise conventional copyright disputes and currently lack specialized mechanisms for regulating AI-related copyright practices (I. A. Khan et al., 2025). Regulatory authorities also possess limited technical expertise regarding algorithmic learning processes, automated data extraction, and dataset management. Copyright owners frequently face difficulties in detecting unauthorized use of their works because AI developers rarely disclose the precise contents or sources of training datasets. The absence of transparency obligations further reduces accountability and complicates the enforcement of copyright rights. Additionally, courts may encounter significant evidentiary and technical challenges when determining whether AI training constitutes copyright infringement under existing legal principles. These institutional limitations demonstrate that effective regulation requires not only legislative reform but also strengthened regulatory capacity, technical expertise, judicial training, and improved coordination among intellectual property authorities, technology regulators, and judicial institutions (Asghar et al., 2025).

Need for AI-Specific Copyright Reforms

The doctrinal analysis clearly establishes the necessity of introducing AI-specific copyright reforms within Pakistan's intellectual property framework. Legislative amendments should expressly define artificial intelligence, machine learning, training datasets, and text and data mining while clarifying the legal consequences of reproducing copyrighted works during AI training. The law should establish clear criteria determining when authorization from copyright owners is required and when carefully limited statutory exceptions may apply. Transparent licensing frameworks should be introduced to facilitate lawful access to copyrighted materials while ensuring fair remuneration for creators (Shami, Khaled, et al., 2025). Legislative reforms should also require reasonable transparency regarding data acquisition practices, encourage responsible data governance, and establish accountability obligations for AI developers. Furthermore, regulatory authorities should issue detailed implementation guidelines capable of adapting to technological advancements without requiring frequent legislative amendments. Institutional reforms should strengthen enforcement mechanisms, improve judicial expertise, encourage stakeholder consultation, and facilitate cooperation between government agencies, industry, academia, and copyright owners. Collectively, these reforms would modernize Pakistan's copyright regime, reduce legal uncertainty, encourage responsible innovation, protect the interests of creators, and establish a sustainable legal framework capable of responding to future developments in artificial intelligence (Azhar et al., 2025).

PROPOSAL FOR A COMPREHENSIVE LEGAL AND POLICY FRAMEWORK

Legislative Reforms for AI Training on Copyrighted Works

Pakistan requires a modern legislative framework that explicitly regulates the use of copyrighted works for artificial intelligence training while maintaining an appropriate balance between innovation and copyright protection. The Copyright Ordinance, 1962 should be amended to define key concepts such as artificial intelligence, machine learning, training datasets, and text and data mining. The legislation should clearly specify whether the reproduction and processing of copyrighted works for AI training constitute copyright-restricted acts and identify the circumstances under which such activities may be lawfully undertaken. It should also establish transparent licensing mechanisms, clarify the scope of permissible exceptions for research and innovation, and introduce obligations relating to accountability, transparency, and responsible use of copyrighted content. Such legislative reforms would provide legal certainty to copyright owners, AI developers, researchers, and investors while reducing disputes arising from ambiguous statutory interpretation.

Policy Guidelines for Responsible AI Development

In addition to legislative reform, Pakistan should adopt comprehensive national policy guidelines to promote the responsible development and deployment of artificial intelligence. These guidelines should encourage ethical data collection, lawful acquisition of training datasets, transparency regarding the sources of copyrighted materials, and respect for intellectual property rights throughout the AI development process. AI developers should be encouraged to maintain proper documentation of data acquisition practices and implement governance mechanisms that minimize unauthorized use of copyrighted content. Public institutions should also promote awareness of copyright compliance among technology companies, academic institutions, and research organizations. Furthermore, collaboration between government agencies, universities, industry stakeholders, and copyright owners should be encouraged to develop practical standards that facilitate innovation without compromising the rights of creators.

Institutional and Regulatory Mechanisms

An effective legal framework must be supported by strong institutional and regulatory mechanisms capable of supervising AI-related copyright practices. Pakistan should strengthen the capacity of existing intellectual property institutions by establishing specialized units responsible for monitoring developments in artificial intelligence and digital copyright. Regulatory authorities should issue implementation guidelines clarifying compliance requirements for AI developers and provide mechanisms for dispute resolution relating to AI training activities. Institutional cooperation among intellectual property authorities, technology regulators, academic experts, and judicial bodies should be enhanced to ensure consistent interpretation and enforcement of copyright law. Capacity-building initiatives, judicial training, and technical expertise should also be developed to enable regulators and courts to address increasingly complex AI-related legal disputes effectively.

Future Directions and Recommendations

The future regulation of artificial intelligence in Pakistan should adopt a dynamic and technology-neutral approach capable of adapting to continuous technological advancement. Periodic legislative review should be undertaken to ensure that copyright law remains responsive to emerging AI technologies and international legal developments. Policymakers should encourage responsible innovation through balanced regulatory measures that protect the legitimate interests of copyright owners while facilitating research, investment, and digital economic growth. Greater international cooperation should also be pursued to harmonize domestic copyright standards with evolving global practices and facilitate cross-border technological collaboration. Ultimately, a comprehensive legal and policy framework that combines legislative reform, ethical governance, effective regulatory oversight, and institutional coordination will provide legal certainty, strengthen copyright protection, encourage responsible AI development, and position Pakistan to participate more effectively in the rapidly evolving global digital economy.

CONCLUSION

The rapid advancement of artificial intelligence has transformed the manner in which creative works are produced, accessed and utilized across the world. At the heart of this transformation lies the extensive use of copyrighted literary, artistic, musical and audiovisual works for training AI systems. While AI technologies promise significant economic, educational and technological benefits, they simultaneously raise complex legal and ethical questions regarding copyright ownership, authorization, fair use of protected works and the rights of creators. In Pakistan, these concerns are particularly significant because the Copyright Ordinance, 1962 was enacted long before the emergence of modern machine learning technologies and does not explicitly regulate the use of copyrighted content for AI training. Consequently, the absence of a clear legal framework has created uncertainty for copyright owners, AI developers, researchers and policymakers, increasing the likelihood of legal disputes and discouraging responsible innovation.

This doctrinal analysis demonstrates that Pakistan's existing copyright regime is insufficient to address the unique legal challenges posed by artificial intelligence. Although the current law provides protection to authors against unauthorized reproduction, adaptation and distribution of their works, it does not clarify whether the extraction and computational analysis of copyrighted materials for AI model training constitute copyright infringement or fall within permissible exceptions. The lack of statutory guidance also creates ambiguity regarding text and data mining, licensing obligations, ownership of AI-generated outputs and the allocation of liability when AI systems produce content resembling protected works. Such legislative gaps hinder the balanced development of both the creative economy and the emerging AI industry.

The study further establishes that international developments provide valuable guidance for Pakistan. Several jurisdictions have begun introducing specific provisions governing AI training, text and data mining, transparency obligations and licensing mechanisms to balance technological innovation with the protection of intellectual property rights. These comparative approaches demonstrate that effective regulation does not require choosing between innovation and copyright protection; rather, it requires carefully designed legal standards that accommodate both objectives. Pakistan can benefit from these experiences by adopting context-specific reforms that reflect its constitutional principles, economic priorities and international obligations while addressing the needs of domestic creators, educational institutions, technology companies and research organizations.

The proposed legal and policy framework emphasizes the necessity of comprehensive legislative reform supported by institutional capacity building and stakeholder collaboration. Amendments to Pakistan's copyright legislation should clearly define the legal status of AI training on copyrighted works, establish transparent licensing systems, introduce appropriate exceptions for research and education, ensure fair remuneration for rights holders and impose reasonable transparency obligations on AI developers. Equally important are the establishment of regulatory oversight mechanisms, development of technical standards, promotion of copyright awareness and strengthening of enforcement institutions to ensure effective implementation. Such reforms would provide legal certainty, encourage responsible AI innovation and protect the legitimate interests of authors and copyright owners.

In conclusion, the future of artificial intelligence in Pakistan depends upon achieving an equitable balance between technological progress and intellectual property protection. An outdated legal framework cannot adequately regulate rapidly evolving AI technologies or safeguard the rights of creators in the digital age. Therefore, Pakistan should adopt a modern, comprehensive and forward-looking copyright framework that recognizes both the transformative potential of artificial intelligence and the enduring value of human creativity. By implementing coherent legal reforms and effective policy measures, Pakistan can foster innovation, attract investment, promote ethical AI development and strengthen confidence in its intellectual property system while ensuring that technological advancement remains consistent with the principles of justice, fairness and sustainable economic development.

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