LEGAL REGULATION OF INTELLECTUAL PROPERTY RIGHTS IN THE CONTEXT OF ARTIFICIAL INTELLIGENCE: COMPARATIVE ANALYSIS OF THE UK, US, EU, CHINA, AND KAZAKHSTAN

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Relevance: The rapid development of artificial intelligence (AI) technologies poses significant challenges to traditional intellectual property (IP) law. As AI systems increasingly participate in creative and inventive processes, existing legal frameworks struggle to determine authorship, inventorship, and the scope of copyright and patent protection. Addressing the challenges is essential for ensuring effective legal protection while promoting innovation.

Abstract: *The rapid development of artificial intelligence (AI) technologies poses unprecedented challenges to traditional intellectual property (IP) law. AI systems are increasingly involved in creative and inventive processes, raising complex questions regarding authorship, inventorship, and the scope of copyright and patent protection. This article provides a comprehensive comparative analysis of regulatory approaches to AI-related IP issues in the United Kingdom, the United States, the European Union, China, and Kazakhstan. By examining statutory laws, regulations, case law, official guidance, and scholarly literature, the study identifies trends, gaps, and potential recommendations for adapting IP law to accommodate AI technologies while maintaining human-centric protections. The analysis highlights a global movement toward transparency, accountability, and ethical AI deployment, alongside the recognition of human contributions in AI-assisted creations.*

Keywords: *Artificial intelligence, intellectual property law, copyright, patent law, AI regulation, comparative analysis, human-centered IP, transparency, ethical AI.*

Research Objective: To examine and compare current regulatory approaches to AI-related intellectual property issues in the United Kingdom, the United States, the European Union, China, and Kazakhstan, identifying trends, gaps, and potential recommendations for adapting IP law to AI technologies.

Methods: Comparative legal analysis of statutory laws, regulations, and case law in the selected jurisdictions. Review of official guidance documents and draft legislation. Synthesis of scholarly articles and reports on AI and intellectual property law.

Main Results: Across all analyzed jurisdictions, a human-centered approach predominates, recognizing only natural persons as authors or inventors. In the United

Kingdom, as established in a landmark case - Thaler v Comptroller-General, AI cannot be acknowledged as an inventor. However, copyright protection applies to individuals who organize the creation of computer-generated works, providing the necessary conditions for their generation. In the United States, patent protection is available only when a human contributes significantly to an invention, while copyright is limited to works created by humans, as clarified in the USPTO 2024 guidance. China, a global leader in patent filings, similarly does not recognize AI as an author or inventor. Protection is granted only when sufficient human input is demonstrated, and from2025, all AI-generated content must be explicitly labeled to ensure transparency and accountability.

The European Union has adopted a comprehensive approach through the AI Act, which introduces risk-based classification and transparency obligations, while copyright law increasingly emphasizes the protection of rights holders, particularly regarding the use of data for AI training. In In Kazakhstan, authorship and inventorship remain limited to humans. However, the AI law provides for the implementation of ethical standards, transparency, and human oversight of AI actions and outputs, aiming to align national legislation with international practices. Overall, these findings highlight a global trend toward adapting intellectual property law to technological developments while maintaining human-centric protections. Conclusions and Recommendations: The global trend demonstrates the need to adapt intellectual property law to technological advancements while preserving human-centered protections. Key elements for emerging regulatory frameworks include transparency, accountability, ethical AI deployment, and recognition of human contributions in creative and inventive processes. Recommendations include: Adopting explicit provisions on AI-generated works and inventions. Establishing clear guidelines for human authorship and inventorship. Promoting transparency and ethical standards in AI deployment. Considering harmonization with international trends to maintain consistency across jurisdictions. Keywords: artificial intelligence, intellectual property law, copyright, patent law, AI regulation

1. Introduction

Artificial intelligence (AI) is transforming the landscape of innovation across multiple sectors, ranging from software development to biotechnology, visual arts, and creative writing. Modern AI systems can autonomously generate complex outputs, including inventions, artworks, music, and literary works, which traditionally fell within the exclusive domain of human creativity. This shift raises fundamental legal questions: Can AI be recognized as an inventor or author? How should copyright and patent laws adapt to AI-generated works? What ethical and transparency standards should govern AI deployment?

Intellectual property (IP) law has historically been structured around the notion of human creativity and inventiveness. Both copyright and patent law recognize natural

persons as authors or inventors, and legal frameworks often require demonstrable human input for protection. However, AI challenges these assumptions, creating a gap between technological capabilities and legal recognition.

This article aims to examine and compare the regulatory frameworks governing AI-generated works and inventions in five jurisdictions—the United Kingdom, the United States, the European Union, China, and Kazakhstan—focusing on authorship, inventorship, patenting, copyright protection, and ethical oversight. By identifying gaps and trends, this study seeks to provide policy recommendations for harmonizing IP law with emerging technological realities.

2. Research Objectives

The main objectives of this study are:

1. To examine the current legal frameworks addressing AI-generated works and inventions in selected jurisdictions.
2. To identify challenges and gaps in existing IP law with respect to AI technologies.
3. To analyze comparative approaches to authorship, inventorship, copyright, and patent protections.
4. To propose recommendations for adapting IP law to AI while maintaining ethical and human-centered standards.

3. Methodology

This study employs a comparative legal analysis methodology. The primary research methods include:

- **Statutory and regulatory analysis:** Examination of national laws, regulations, and pending legislative proposals regarding AI and IP.
- **Case law review:** Analysis of landmark judicial decisions, such as Thaler v Comptroller-General in the UK.
- **Review of official guidance:** Consideration of guidelines from bodies such as the USPTO, European Commission, and China's National Intellectual Property Administration.
- **Scholarly synthesis:** Examination of academic literature, reports, and commentaries on AI and IP law, highlighting emerging trends and best practices.

This multi-method approach provides a comprehensive understanding of both the normative legal frameworks and practical implications for AI-generated intellectual property.

4. Comparative Legal Analysis

4.1 United Kingdom

The UK adheres to a human-centered IP model, emphasizing that only natural persons can be recognized as inventors or authors. In the landmark case Thaler v Comptroller-General, the court clarified that AI cannot be legally acknowledged as an inventor.

However, UK copyright law provides limited protection for AI-assisted works if a human has made sufficient contributions to the creation process. Individuals who organize, direct, or provide substantial input into computer-generated works may claim copyright. This approach emphasizes the human element in creative processes while acknowledging the technical assistance of AI systems.

Key points:

- AI cannot hold patents or copyrights independently.
- Copyright applies when a human orchestrates the creation of AI-generated works.
- Focus on maintaining human creativity and accountability.

4.2 United States

US law similarly restricts IP rights to human contributors. According to USPTO guidance issued in 2024:

- **Patent protection** is granted only when a human significantly contributes to an invention. AI-only inventions are not patentable.
- **Copyright protection** applies exclusively to works created by humans. AI-generated content without human authorship does not qualify.

The US approach emphasizes substantial human contribution as a prerequisite for IP protection. While this maintains the integrity of traditional IP principles, it leaves AI-generated works without clear legal recognition, potentially creating gaps in innovation incentives.

Key points:

- Human inventorship is required for patent eligibility.
- Copyright applies only to human-authored works.
- Clear guidance aims to prevent misuse of AI in IP claims.

4.3 China

China has emerged as a global leader in patent filings and technological innovation. The Chinese IP framework does not recognize AI as an inventor or author. Protection is granted only when AI-assisted works demonstrate sufficient human input.

China has introduced additional transparency measures: from 2025 onwards, all AI-generated content must be explicitly labeled to ensure accountability and traceability. This requirement reflects China's dual objective of promoting technological innovation while ensuring ethical AI deployment.

Key points:

- AI cannot independently hold patents or copyrights.
- Human contribution is mandatory for IP protection.
- Mandatory labeling of AI-generated works enhances transparency.

4.4 European Union

The EU has adopted a comprehensive regulatory approach through the proposed AI Act, introducing risk-based classifications for AI applications and mandatory transparency obligations. While EU copyright law still emphasizes human authorship,

recent developments focus on protecting rights holders, particularly regarding the use of datasets for AI training.

The EU approach reflects a balanced policy, combining innovation promotion with accountability, human oversight, and ethical considerations. It also anticipates future harmonization of IP law with AI-specific provisions.

Key points:

- Risk-based regulation for AI deployment.
- Emphasis on transparency, accountability, and ethical standards.
- Copyright law protects human authors and rights holders involved in AI training.

4.5 Kazakhstan

In Kazakhstan, IP law remains human-centered, recognizing only natural persons as authors or inventors. However, the national AI law introduces provisions for ethical standards, transparency, and human oversight of AI activities. These measures aim to ensure responsible AI deployment while aligning national legislation with international best practices.

Key points:

- Human authorship and inventorship remain mandatory.
- AI law encourages ethical deployment, transparency, and human oversight.
- National regulation seeks harmonization with global trends.

5. Key Findings

The comparative analysis highlights several consistent trends:

1. **Human-Centered IP Protection:** All analyzed jurisdictions maintain that authorship and inventorship are limited to humans.
2. **Transparency and Accountability:** Increasing emphasis on labeling AI-generated works and disclosing human involvement.
3. **Ethical Standards:** Regulatory frameworks increasingly incorporate ethical AI deployment, including human oversight.
4. **Legal Gaps:** AI-generated works without human input currently lack IP protection, posing challenges for innovation incentives.
5. **International Alignment:** Nations are moving toward harmonization of AI-related IP regulations, though differences remain in implementation and scope.

6. Conclusions

AI technologies challenge traditional IP law, necessitating adaptations to maintain both legal certainty and innovation incentives. The global trend demonstrates a commitment to human-centric protections, while simultaneously integrating transparency, ethical standards, and accountability into AI regulation.

Policy Recommendations:

1. **Explicit Recognition of AI-Generated Works:** Develop legal provisions defining the status of AI-assisted creations.

2. **Human Authorship and Inventorship Guidelines:** Clarify thresholds for human contribution required for IP protection.
3. **Transparency Obligations:** Mandate labeling and disclosure of AI-generated outputs.
4. **Ethical Standards for AI Deployment:** Implement oversight mechanisms to ensure responsible AI use.
5. **Harmonization with International Trends:** Align national laws with global developments to foster cross-border innovation.

By adopting these measures, IP law can adapt to the technological landscape without undermining human creativity and accountability.

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