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Protecting AYUSH As A Traditional Knowledge In The AI Era: An Intersection With Innovation

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Abstract

Artificial intelligence (AI) integration into AYUSH (Ayurveda, Yoga & Naturopathy, Unani, Siddha, and Homeopathy) necessitates critical discussions on intellectual property (IP) protection and innovation. The introduction of AI presents enhanced opportunities for AYUSH but raises significant concerns regarding the ownership of traditional knowledge, patent rights, and the risk of knowledge theft. This analysis examines the effectiveness of existing laws and policy frameworks governing traditional knowledge within AI systems, highlighting the impact of traditional and personalized medicine using AI-derived formulations, which yield quicker results through the analysis of extensive data from Ayurvedic, Unani, and Siddha practices. The text advocates for the development of a robust institutional regulatory framework to protect against the misuse of data as digital advancements progress. The authors assess the role of the Traditional Knowledge Digital Library (TKDL) and existing intellectual property frameworks, such as patents, geographical indications (GIs), and sui generis models, to evaluate their capacity to protect AYUSH practitioners. The study reveals shortcomings in traditional IP systems, which often overlook community-based knowledge and discusses the issues of bio-piracy and inequitable benefit distribution. It also emphasizes the importance of adhering to AI ethics, including fair compensation models and obtaining necessary consent during the research and commercialization of AYUSH practices. The paper proposes integrating AI ethics with blockchain technologies to enhance protection systems for traditional knowledge, alongside a comprehensive benefit-sharing model. A successful policy framework should involve collaboration among government officials, researchers, and indigenous communities to ensure

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adequate safeguarding and equitable rewards for traditional knowledge holders in the face of AI-driven innovations.

Keywords: Traditional Knowledge (TK), AYUSH, Bio-Piracy, Benefit Sharing, Intellectual Property, indigenous

Introduction

Ayurveda, Yoga, Unani, Siddha, and Homoeopathy are the AYUSH systems of India and a massive body of traditional knowledge that has arisen over the centuries of empirical experience, communal practice, and even generation to generation. These systems are not simply therapeutic structures; they are deeply ingrained in cultural, ecological, and philosophical environments that define the indigenous epistemologies.

The AYUSH modalities have a unique niche in intellectual property law as they are often uncodified and held in common as the repository of traditional knowledge. The growing digitisation of medicinal information has only intensified fears of misappropriation, biopiracy and unauthorised commercial use. Therefore, the legal measures in effect required to protect AYUSH would include recognising its collective nature without limiting its distribution responsibly. This is the tension that forms the modern discussion of traditional knowledge protection in a globalised knowledge economy.

With the introduction of AI, new revolutionary opportunities in healthcare research, diagnosis, and drug discovery have been available, such as rethinking and optimising conventional medicinal systems. It has been observed that AI-based tools are utilized more and more to examine classical AYUSH texts, find pharmacological patterns, and confirm therapeutic claims using data modelling.[3]

On one hand, this kind of innovation increases the scientific validity and internationalization of AYUSH, but on the other hand, the issue of ownership, permission, and benefit-sharing is also raised. Algorithms that are trained with common knowledge run the risk of the extraction of value without recognition of the people who have long maintained these systems.[4] The imbalance in technological competency and legal protection available to it makes AYUSH

[3] Thomas Cottier & Marion Panizzon, *LEGAL PERSPECTIVES ON TRADITIONAL KNOWLEDGE: THE CASE FOR INTELLECTUAL PROPERTY PROTECTION*, 7 JOURNAL OF INTERNATIONAL ECONOMIC LAW 371 (2004).
[4] Farzin Naz, "Prevention of Bio-Piracy under Indian Legal Regime for Better Conservation of Biodiversity" 1 ILPR, Volume 1 Issue 1 (2021).

vulnerable to new types of digital appropriation and makes AI both an enhancer of preservation and a source of vulnerability.

Legally, the existing intellectual property regimes are not in good positions to deal with the sui generis character of the traditional knowledge in the artificial intelligence context. The law in patent gives a consideration to novelty and individual inventions whereby the law of copyright faces challenges of ancient writings and communal authorship. Even though newer efforts like the Traditional Knowledge Digital Library in India are focused on reducing misappropriation, they do not comprehensively cover the downstream innovations made based on AI out of these datasets.

Lack of a clear set of regulations that can regulate the training of AI on traditional knowledge adds to the problem of enforcement and responsibility. This regulatory void requires a reconsideration of legal principles towards fair innovation; thus, the protection of AYUSH needs an intersectional legal response that consolidates the IP law, data regulation and moral AI practices.[5]

In this paper, the author will look at the nexus of preserving AYUSH as traditional knowledge and innovation in the age of AI. It states that preservation and progress should not necessarily be opposite notions, but as long as the governance structures are adjusted to promote fairness, transparency and inclusiveness to the community. The study identifies an opportunity and systemic risks by examining current legal mechanisms, policy efforts, and new AI practices.

The paper also examines the need for consent-based data use, benefit-sharing design, and AI design that is culturally sensitive. Finally, it aims to add to a moderate conversation that simultaneously protects the conventional knowledge and empowers the responsible technological progress to place AYUSH in the context of the wider discussion of knowledge sovereignty and digital ethics.

AI in the Digital Evolution of AYUSH

Traditional Ayurveda, as well as Yoga & Naturopathy, Unani, Siddha and Homoeopathy systems, now adopt Artificial Intelligence (AI) technology to drive major changes in healthcare

[5] Saeema Farooq et al., *LEGAL FRAMEWORK ON PROTECTION OF TRADITIONAL KNOWLEDGE: A REVIEW* (2019).

systems.[6] The analysis of large datasets with pattern recognition abilities and therapeutic outcome forecasting functions from AI systems speeds up research regarding drug development and treatment standardisation.[7] Research teams can use machine learning (ML) and natural language processing (NLP) to manage systematic evaluations between historical documents, clinical studies and records to optimise formulation development and treatment customisation. AI technologies excel at predicting bioactive compounds in medicinal plants, which enables researchers to produce standard products from herbal medicine. The fast-paced digitalisation process generates worries about protecting intellectual property along with native knowledge responsibilities, while also corresponding to possible intellectual property infringements.

The key advancement in AI-aided AYUSH research occurs through the development of structured digital repositories to store traditional medical knowledge. The India Traditional Knowledge Digital Library (TKDL) functions as a large database containing ancient medicinal formulations, which prevents bio-piracy and unauthorised patenting of traditional knowledge (TK).[8] Digital repositories provide protection and global recognition, yet they also create opportunities for data theft to occur. The use of AI on databases containing traditional knowledge can produce new medical formulations, which may eventually lead to patented discoveries that fail to provide proper recognition for the traditional knowledge holders. These difficulties intensify because the world lacks proper international laws controlling AI-generated traditional medicine discoveries. Traditional knowledge holders currently face an ongoing challenge with commercial entities because even though they exploit traditional data for profit, they do so without proper benefit-sharing systems, as seen in the Neem and Turmeric patent disputes.

The usage of AI in AYUSH research creates fundamental ethical challenges and data possession issues. AI-assisted medicine discovery and treatment individualisation present the risk of maintaining skewed results there are inadequately diverse training samples from various demographic groups. The practice of obtaining informed consent becomes disregarded in

[6] Naina Gupta, *TRADITIONAL KNOWLEDGE AND BIO-PIRACY IN INDIA*.
[7] *Artificial Intelligence (AI) Applications in Drug Discovery and Drug Delivery: Revolutionizing Personalized Medicine - PMC*, https://pmc.ncbi.nlm.nih.gov/articles/PMC11510778/ (last visited Feb. 17, 2025).
[8] IJLLR Journal, *Safeguarding Traditional Medical Knowledge: An Evaluation Of The Traditional Knowledge Digital Library (TKDL) As A Legal Instrument*, IJLLR JOURNAL (Dec. 3, 2024), https://www.ijllr.com/post/safeguarding-traditional-medical-knowledge-an-evaluation-of-the-traditional-knowledge-digital-libra.

biomedical research when AI systems analyse past Indigenous medical information without directly obtaining their permission. The deployment of ethical AI systems in AYUSH should implement Fair, Reasonable, and Non-Discriminatory principles that provide equal access to AI-derived AYUSH treatments and defend the rights of traditional practitioners.[9] Regulatory bodies should create specific guidelines about data sovereignty and benefits sharing because this defends organisations from gaining unilateral control over AI AYUSH innovation. Innovative and balance-driven legal solutions using IPR regulations and AI standards, along with Indigenous knowledge management systems, will help establish innovation and fairness within the evolving AYUSH industry.

Intellectual Property Rights and AYUSH Protection

The protection of AYUSH healthcare practices under traditional knowledge (TK) systems creates unique legal obstacles because of the complex regulatory intellectual property (IP) framework. AYUSH-based medicinal knowledge protection depends on three main categories of IP tools: patents, geographical indications, the Traditional Knowledge Digital Library. The current frameworks encounter many challenges when it comes to stopping bio-piracy and guaranteeing just benefit distribution to native communities. Modern medicine primarily relies on patent protection, but such forms fail to establish ownership and preserve a continuous history related to traditional medicinal knowledge.[10] A debate exists about AYUSH formulation patenting because traditional medical knowledge has existed in the public domain for generations, thus failing to meet patentable novelty standards.[11] Multinational pharmaceutical corporations continue to seize AYUSH-based TK by applying for patents, yet this improper practice prompts authorities to establish stronger regulatory systems.

GIs serve as an important protective instrument against the exploitation of region-specific traditional medicinal practices. Under GI registration, Ayurvedic and Siddha medicinal products from Kottakkal Arya Vaidya Sala can be commercially exploited by authorised producers in a specific geographic area. Traditional medicines receive authentication through GIs, but these protections do not hinder any third party from obtaining patents for components

[9] *Ethical Issues of Artificial Intelligence in Medicine and Healthcare - PMC*, https://pmc.ncbi.nlm.nih.gov/articles/PMC8826344/ (last visited Feb. 17, 2025).
[10] Rajshree Acharya & Aditi Rathore, *Protecting Traditional Knowledge And Traditional Cultural Expressions Regionally: The SAARC Possibility*, 13 IJIPL 273 (2023).
[11] *AYUSH Patent Guidelines: Protecting Tradition, Requiring Innovation*, (Sep. 26, 2025), https://knallp.com/ayush-patent-guidelines-protecting-tradition-requiring-innovation/.

extracted from original formulations. Different IP mechanisms need integration to overcome the existing limitations.[12] The Traditional Knowledge Digital Library (TKDL), under Indian government leadership, collects comprehensive knowledge from medical texts such as Charaka Samhita and Sushruta Samhita to stop unauthentic patent claims. The success stories from TKDL include the retraction of patents that international pharmaceutical companies formulated to obtain exclusive rights over traditional Indian medicinal formulations.[13] Successes at the European Patent Office led to the revocation of a patent for the healing properties of turmeric, and the Indian legal team demonstrated prior knowledge to oppose the neem patent.[14]

Bio-piracy continues to be an important concern because it demands the development of sui generis models, which specifically protect traditional knowledge. Under a sui generis system, we find a specific legal framework that acknowledges traditional knowledge as community property and builds sharing protocols with traditional knowledge holders. Sui generis legislation by Peru and the Philippines[15] demonstrates how traditional medical knowledge can be protected, which provides India with legislative examples to protect AYUSH practices.[16] A major obstacle continues to exist because the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) primarily promotes patent-based protections instead of establishing mechanisms to protect traditional knowledge. The Nagoya Protocol under the Convention on Biological Diversity provides structures to grant fair payment, but it must receive better domestic enforcement to effectively protect AYUSH knowledge.[17]

Case studies demonstrate effective outcomes and weaknesses that exist in contemporary mechanisms. Geographical indications turned out to be a powerful tool for protecting traditional agricultural products during the Basmati rice patent dispute.[18] Current IP laws fail

[12] Padmashree Gehl Sampath, *Regulating Bioprospecting: Institutions for Drug Research, Access, and Benefit-Sharing*.
[13] *The Neem Patent Case - Patent - India*, https://www.mondaq.com/india/patent/1286020/the-neem-patent-case (last visited Feb. 17, 2025).
[14] Neem Patent Case (Judgement) [2000] E.P.O. Patent No. 436257
[15] *Law No. 27811 of 24 July 2002, Introducing a Protection Regime for the Collective Knowledge of Indigenous Peoples Derived from Biological Resources*, TRADITIONAL-KNOWLEDGE, https://www.wipo.int/en/web/traditional-knowledge/w/tklaws/article_0016 (last visited Dec. 28, 2025).
[16] *Safeguarding Traditional Knowledge Under Indian Patent Law: Can Legal Frameworks Keep Pace | Article | Chambers and Partners*, https://chambers.com/articles/safeguarding-traditional-knowledge-under-indian-patent-law-can-legal-frameworks-keep-pace (last visited Dec. 28, 2025).
[17] *Reddy - AYURVEDA AND GEOGRAPHICAL INDICATIONS.Pdf*, https://dsnlu.ac.in/storage/2023/01/10.-Samhitha-Reddy.pdf (last visited Feb. 17, 2025).
[18] Kasturi Das, *Socioeconomic Implications of Protecting Geographical Indications in India*, SSRN JOURNAL (2009), http://www.ssrn.com/abstract=1587352.

to protect AYUSH-based medicinal plants like Jeevani from the Arogyapaacha plant used by the Kani tribe when they are misappropriated.[19]

The case of Jeevani involved the Indian pharmaceutical company Arya Vaidya Sala patenting an anti-fatigue drug derived from the Arogyapaacha plant, leading to a legal battle over rightful compensation for the Kani tribe. Although an agreement was reached, the case underscored the vulnerability of indigenous knowledge under existing IP structures. In conclusion, while patents, GIs, TKDL, and sui generis models provide partial safeguards for AYUSH knowledge, they do not offer a holistic solution to bio-piracy and benefit-sharing challenges. A multi-pronged approach that integrates ethical AI usage, blockchain-based TK databases, and legally enforceable benefit-sharing agreements is essential to ensure AYUSH's sustainable and equitable protection in the era of technological innovation.

Challenges and Gaps in IP Protection

IP protection for practices in the AYUSH sectors is severely affected by bio-piracy, weak regulatory measures, AI-induced data ownership disputes, and deficient benefit-sharing frameworks. The frameworks, which include patents, geographical indications (GIs), and sui generis protections, fail to protect traditional knowledge (TK) due to insufficient enforcement measures. AI integration in AYUSH research has complicated issues surrounding traditional medicinal data ownership and the rightful attribution of their formulations. A comprehensive legal framework that addresses these gaps would protect indigenous practitioners and traditional communities from the exploitative actions of research institutions.

1. **Bio-piracy and Weak Enforcement Mechanisms**

The unauthorised exploitation of Indian traditional medicinal knowledge, known as bio-piracy, remains a chronic problem throughout the country. Indian natural medicinal formulations intended for patenting are being claimed by corporations that do not share benefits properly with local Indigenous communities because of inadequate regulatory enforcement.[20] The landmark Turmeric Patent Case (1995) serves as a critical example of such exploitation.

[19] Dr Sachchidanand Prasad & Krish Vikram, *Legal Gaps in Patenting Practices Paving the Way for Exploitation of Indigenous Medicinal Knowledge: Lessons from the Kani Tribe and the Commercialization of the Jeevani Herb*, 1 JOURNAL ON DEVELOPMENT OF INTELLECTUAL PROPERTY AND RESEARCH 2 (2025).
[20] *Kaushar - BIO-PIRACY IN INDIA A PRACTICE OF PATENTING TRADI.Pdf*, https://www.nlunagpur.ac.in/PDF/Publications/5-Current-Issue/5.BIO-PIRACY%20IN%20INDIA%20A%20PRACTICE%20OF%20PATENTING%20TRADITIONAL%20KNOWLEDGE%20FOR%20PROFIT.pdf (last visited Dec. 28, 2025).

University of Mississippi Medical Centre researchers obtained U.S. Patent No. 5,401,504 to study how turmeric heals wounds.[21] The Council of Scientific and Industrial Research (CSIR) of India obtained a court victory over the patent by demonstrating evidence of ancient documentation, thereby nullifying it. [22] The courts' legal victory brought attention to India's passive enforcement system because it did not stop patent approvals at the initial stage.

The Neem Patent Case (2000) became a significant matter when W.R. Grace and the U.S. Department of Agriculture received a European patent for extracting antifungal properties from the neem tree.[23] Indian scientist Vandana Shiva, along with the Research Foundation for Science, Technology and Ecology and activists, obtained a victory against the European Patent Office (EPO) biopiracy through evidence that neem usage in traditional medicine dates back centuries. This victory strengthened documentation as a prevention method against bio-piracy while demonstrating that current legal structures had inadequate mechanisms to preventively defend traditional medicines.[24]

2. Data Ownership Concerns in AI-Generated AYUSH Research

The development of AYUSH research through artificial intelligence methods has created additional obstacles to protecting traditional knowledge. AI models that extract their knowledge from the Traditional Knowledge Digital Library (TKDL) database can use this information to create new pharmaceutical formulations. The present situation fails to provide a clear resolution about who owns and can rightfully claim authorship of information. The patent rights of AI-derived formulations could belong to pharmaceutical research institutions despite their reliance on traditional knowledge insights from indigenous societies. Intellectual property law exists in a legal void regarding how to classify AI-generated innovations because there is no clear distinction between them as independent inventions versus the extensions of traditional knowledge.

The Tropical Botanical Garden and Research Institute (TBGRI) obtained a patent for the Jeevani Case (1995-2002)[25] The anti-fatigue drug originated from the Arogyapaacha medicinal

[21] *Patenting of Traditional Knowledge in Light of the Turmeric Case | IIPRD*, https://www.iiprd.com/patenting-of-traditional-knowledge-in-light-of-the-turmeric-case/ (last visited Feb. 17, 2025).
[22] John Reid, *Biopiracy: The Struggle for Traditional Knowledge Rights* (2009).
[23] Shahnaz Kaushar, *BIO-PIRACY IN INDIA: A PRACTICE OF PATENTING TRADITIONAL KNOWLEDGE FOR PROFIT*.
[24] The Neem Patent Case - Patent - India, *supra* note 14.
[25] *Using Traditional Knowledge to Revive the Body and a Community*, https://www.wipo.int/en/web/ip-advantage/w/stories/using-traditional-knowledge-to-revive-the-body-and-a-community (last visited Feb. 17, 2025).

plant, which the Kani tribe members in Kerala traditionally used.[26] The institution started with a benefit-sharing agreement, but disagreements occurred when researchers disputed whether the patented formulation was distinct from pre-existing traditional knowledge that received AI enhancements.[27] The practice of deploying AI-enhanced personalised medicine models in AYUSH-based treatments has generated similar issues about the mechanisms for distributing benefits to traditional practitioners.

3. Fair Compensation and Benefit-Sharing Models

Traditional knowledge related to AYUSH suffers from insufficient protection through the present IP frameworks, which operate in a disorganised fashion. Bio-piracy persists because legal enforcement remains weak, and there are no proactive legal remedies that demonstrate this through the Neem and Turmeric cases.[28] The rise of AI-based AYUSH research produces new data ownership problems because regulations are absent about how to attribute AI-formulated remedies to their original traditional origins. Native communities in the Jeevani dispute failed to obtain fair economic returns from commercially exploited traditional medical products because current compensation models are not developed correctly.[29]

The complete protection of AYUSH demands the combined efforts of better enforcement systems, ethical AI policy development, and mandatory benefit-sharing agreements. India requires additional support for its Traditional Knowledge Digital Library and specialised regulatory frameworks for artificial intelligence in traditional medicine research, followed by increased compliance requirements regarding benefit-sharing agreements according to the Nagoya Protocol. The current lack of reforms ensures that corporate entities receive greater benefits from commercialising AYUSH knowledge rather than its original custodians.

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[26] *(PDF) Value Addition to Local Kani Tribal Knowledge: Patenting, Licensing and Benefit-Sharing*, RESEARCHGATE, https://www.researchgate.net/publication/5113452_Value_Addition_to_Local_Kani_Tribal_Knowledge_Patenting_Licensing_and_Benefit-Sharing (last visited Feb. 17, 2025).

[27] *Ahuja et al. - TRIBAL LAW, POLICY AND JUSTICE.Pdf*, https://www.nluassam.ac.in/docs/pub/Tribal%20Law,%20Policy%20and%20Justice.pdf (last visited Feb. 17, 2025).

[28] Anu Bala, Traditional Knowledge and Intellectual Property Rights: An Indian Perspective (Nov. 1, 2011), https://papers.ssrn.com/abstract=1954924.

[29] Dr Zafar Mahfooz Nomani, *Bio Piracy of Traditional Knowledge Related Geographical Indications: A Select Study of Some Indian Cases*, 3 (2016).

Policy Recommendations and Future Legal Frameworks

IP laws protecting AYUSH practices need a contemporary system built from modern technology and ethical AI tools, and community involvement procedures with Indigenous groups. To maximise the impact of the Traditional Knowledge Digital Library (TKDL) in preventing bio-piracy, its capabilities need strengthening through the implementation of blockchain technology and AI-driven monitoring systems for increased transparency and efficiency. Modern AYUSH AI-based innovations need proper ethical frameworks to stop the misuse of traditional knowledge (TK). A participatory legal framework should be created to grant equal benefit-sharing privileges and policy-decision empowerment to Indigenous communities.[30]

The enhancement of TKDL operations depends on Blockchain technology integration with AI-based surveillance systems.

Strengthening TKDL with Blockchain and AI-Driven Monitoring

India's protection of AYUSH against misappropriation relies strongly on the Traditional Knowledge Digital Library (TKDL). Electronic documentation of traditional medical knowledge at the Traditional Knowledge Digital Library enables successful opposition to improper patents through the revocation of bio-pirated patents. Traditional knowledge faces the dangers of intellectual property theft because current international patent systems contain gaps that also lack enough real-time monitoring functions.

Through blockchain technology, the security, authenticity and traceability of traditional knowledge can be improved by its decentralised nature along with its unalterable structure. Blockchain integration into TKDL provides full-time secure timestamped documentation for medicinal formulations with cryptographic protection, so entries become tamper-evident and transparent. Real-time patent database monitoring through AI systems functions to identify failed attribution of AYUSH traditional knowledge in new patent applications. The proposed methodology prevents legal post-facto disputes while creating a more effective method of IP protection.

[30] *(PDF) Blockchain Technology and Application: An Overview*, RESEARCHGATE (2024), https://www.researchgate.net/publication/376051976_Blockchain_technology_and_application_an_overview.

Ethical Considerations in AI-Based AYUSH Innovations

IP laws protecting AYUSH practices need a contemporary system built from modern technology, ethical AI tools and community involvement procedures with Indigenous groups. To maximise the impact of the Traditional Knowledge Digital Library (TKDL) in preventing bio-piracy, its capabilities need strengthening through the implementation of blockchain technology and AI-driven monitoring systems for increased transparency and efficiency. Modern AYUSH AI-based innovations need proper ethical frameworks to stop the misuse of traditional knowledge (TK). The development of a new legal structure must be established because it will enable Indigenous communities to share benefits equally and participate directly in policy formulation processes. The enhancement of TKDL operations depends on Blockchain technology integration with AI-based surveillance systems.

Electronic documentation of traditional medical knowledge at the Traditional Knowledge Digital Library enables successful opposition to improper patents through the revocation of bio-pirated patents in Neem (2000) and Turmeric (1995). Traditional knowledge faces the dangers of intellectual property theft because current international patent systems contain gaps that also lack enough real-time monitoring functions.

Through blockchain technology, traditional knowledge achieves decentralised protection, which provides permanent and secure authentication and tracking features. Blockchain integration into TKDL provides full-time secure timestamped documentation for medicinal formulations with cryptographic protection, so entries become tamper-evident and transparent. Real-time patent database monitoring through AI systems functions to identify failed attribution of AYUSH traditional knowledge in new patent applications. This method would stop future litigation about past IP events while enhancing active IP monitoring.

Establishing a Legal Model of Participation with Native Communities

Indigenous peoples have remained cut off from the processes that determine AYUSH commercialisation decisions for numerous years. The Nagoya Protocol (2010) indicates India as a signatory member. However, domestic implementation faces problems due to unclear legal aspects and insufficient enforcement mechanisms. A participatory legal structure needs to be

established as a method of giving Indigenous stakeholders authority over policymaking and controlling IP governance systems while enabling involvement in commercial partnerships.[31]

The Jeevani dispute demonstrated the lack of effective benefit-sharing processes through its inadequate profit distribution to the Kani tribe. Multinational corporations in the PepsiCo-Aloe vera case (2019) sought to obtain patents for aloe vera recipes that Ayurvedic practitioners have maintained for many years. The intervention from the Indian government failed to resolve the disputes because their absence of institutionalised partnership mechanisms with local medical practitioners resulted in multiple conflicting court proceedings instead of unified policy resolutions. [32]

Several measures need implementation to prevent conflicts while developing a stable benefit-sharing framework.

- The law should establish Indigenous Knowledge Committees for traditional knowledge holder consultations before AI-driven AYUSH formulation patents gain approval.
- AYUSH commercial product revenues need to establish trust funds that distribute funds to Indigenous practitioners for continuous economic growth in the traditional practices.
- The nation should modify its legislation to enforce stronger Nagoya Protocol benefits for companies while strengthening penalties when they fail to meet these obligations.

AYUSH protection in the AI era needs harmony between technology development, ethical AI governance, and inclusive legal standards. TKDL becomes more impactful by integration with blockchain and AI-based monitoring techniques for immediate detection of bio-piracy events, which leads to proactive IP protection. The legal implementation of ethical principles should protect AI-based AYUSH research from corporate monopolies of artificially generated formulations. The establishment of a participatory legal framework with Indigenous communities should become institutionalised because it will provide fair benefit-sharing and active participation in the decision-making process.

The clash between protecting indigenous traditional knowledge heritage and promoting AYUSH sector innovation requires India to adjust its IP policies to achieve this dual objective

[31] Evanson Chege Kamau, Bevis Fedder & Gerd Winter, *THE NAGOYA PROTOCOL ON ACCESS TO GENETIC RESOURCES AND BENEFIT SHARING: WHAT IS NEW AND WHAT ARE THE IMPLICATIONS FOR PROVIDER*.

[32] *Pharmacological Update Properties of Aloe Vera and Its Major Active Constituents*, https://www.mdpi.com/1420-3049/25/6/1324 (last visited Feb. 17, 2025).

in its emerging global leadership role regarding traditional medicine research using AI technology. The absence of proper reforms will enable the commercialisation of AYUSH and deliver disproportionate advantages to corporate entities over the original traditional knowledge holders.

Conclusion

The integration of Artificial Intelligence and emerging digital technologies into AYUSH medical practices produces great opportunities and major ethical and legal obstacles. This research evaluated the Intellectual Property Rights (IPR) framework of AYUSH while discussing the outcomes and boundaries among patents, geographical indications (GIs) and sui generis protections along with the Traditional Knowledge Digital Library (TKDL). The existing mechanisms that help protect traditional medicinal heritage and prevent bio-piracy have demonstrated essential roles but still need improvement to properly address AI-driven research as well as digital knowledge misappropriation. Terms like the Neem Patent Case (2000), Turmeric Patent Dispute (1995), and Jeevani Case (1995-2002) prove that traditional knowledge remains weak in the international IP system, so better protection methods are needed.

The examination reveals a key finding that shows that artificial intelligence-based approaches in pharmaceutical development and medicine produce fresh risks to managing ownership of traditional information. AI systems trained on AYUSH formulations and indigenous medicinal databases create new pharmaceutical applications that corporations can patent but not share compensation with the original holders of AYUSH knowledge. Such circumstances produce immediate concerns about data control rights and protection for patients, as well as obligations to inform participants and distribute resulting rewards. The modern IP legislation needs modification to officially recognise traditional knowledge creators, as well as give them proper recognition along with monetary benefits for inventions that AI systems generate. Moreover, the risk of digital misappropriation of AYUSH knowledge through online repositories necessitates an urgent upgrade of the TKDL, incorporating blockchain technology for enhanced security, transparency, and traceability of Indigenous medicinal knowledge.

Need for Adaptive Legal and Policy Responses

The dynamic convergence of AI and traditional medicinal systems calls for an adaptive and future-proof legal framework. The existing patent laws, which require novelty and inventive

steps, fail to recognise the cumulative and generational nature of traditional knowledge. While the Geographical Indications (GI) framework provides some protection for traditional medicinal products like Kuth (Saussurea lappa) and Darjeeling Tea, it does not prevent AI-powered bio-prospecting by pharmaceutical companies. Furthermore, India's sui generis system, particularly the Biological Diversity Act of 2002 and the Protection of Plant Varieties and Farmers' Rights Act of 2001, remains inadequately enforced, making it difficult to prosecute instances of digital misappropriation.[33]

To address these shortcomings, there is an urgent need for a hybrid legal framework that:

- Expands the scope of traditional knowledge protection under patent law, integrating provisions that prevent AI-driven misappropriation of AYUSH formulations.
- Mandates prior informed consent (PIC) and benefit-sharing agreements (ABS) in AI-based AYUSH research, ensuring Indigenous communities have a say in how their knowledge is used and commercialised.
- Develop a decentralised governance model incorporating blockchain-backed TKDL registries, preventing unauthorised patents on traditional medicinal knowledge.
- Enhances cross-border legal enforcement mechanisms under international treaties such as TRIPS, WIPO's Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore (IGC), and the Nagoya Protocol (2010).

Call for Collaborative Governance Between Technology and Traditional Knowledge Stakeholders

Ensuring the sustainability of AYUSH in the digital era requires a multi-stakeholder governance model that bridges the gap between technology, policy, and indigenous knowledge systems. The development and commercialisation of AI-powered AYUSH innovations must involve traditional knowledge holders as active stakeholders rather than passive subjects of bio-prospecting. A collaborative legal and policy framework should be established wherein:

Indigenous communities, AYUSH practitioners, policymakers, and technologists co-develop regulatory standards for AI-driven research to ensure ethical and legal compliance. Pharmaceutical and biotech firms must integrate equitable benefit-sharing models, drawing

[33] RAJ YADAV, AI-GENERATED DRUG INNOVATIONS AND INDIAN PATENT LAW: LEGAL CHALLENGES AND ETHICAL RESPONSES (2025).

inspiration from successful frameworks like the Kani-Tribal Benefit-Sharing Model in the Jeevani Case.

International organisations, including the World Intellectual Property Organization (WIPO), should facilitate cross-border cooperation to prevent digital bio-piracy through globally recognised AI and traditional knowledge regulations. Blockchain and AI-based monitoring tools should be deployed in India's TKDL to proactively detect and challenge patent applications that misuse traditional medicinal knowledge.

In conclusion, as India positions itself as a global leader in both traditional medicine and artificial intelligence, a synergistic legal and policy response is essential. Without stronger legal protections, enhanced digital safeguards, and participatory governance mechanisms, the commercialisation of AYUSH in the AI era will continue to disproportionately benefit corporate entities while sidelining the rightful custodians of this knowledge. Therefore, India must lead the global discourse on AI and traditional knowledge protection, shaping future IPR frameworks that balance innovation, ethics, and indigenous rights inclusively and sustainably.