

Protection of Indigenous Traditional Knowledge in The Digital Economy Era: a Review of Customary Law and Intellectual Property Rights

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ABSTRACT

The traditional knowledge held by indigenous communities in Indonesia faces new threats with the development of the digital economy, ranging from data mining by generative artificial intelligence to the tokenization of non-fungible tokens (NFTs) without consent or benefit sharing for the originating communities. This study aims to analyze the conception of traditional knowledge from the perspective of customary law and the national intellectual property legal framework, and to formulate a protection model that is responsive to the challenges of the digital era. The study uses a normative juridical method with a legislative, conceptual, and comparative approach. The results show that customary law views traditional knowledge as communal ownership that is magical-religious and cross-generational, a character that has not been comprehensively accommodated in the Copyright Law, the Patent Law, or the Trademark and Geographical Indications Law. The digital economy presents specific challenges in the form of artificial intelligence data mining, NFT tokenization, cross-border commercialization, and the paradox of defensive documentation. This study recommends a five-element protection model, namely the acceleration of sui generis regulations, a digital database with layered access, the application of the principle of prior informed consent and benefit sharing, transparent artificial intelligence governance, and strengthening the institutional capacity of indigenous peoples, which need to be implemented in an integrated manner and harmonized with developments in international law, especially the WIPO Treaty on Intellectual Property, Genetic Resources and Related Traditional Knowledge in 2024.

Keywords: Traditional Knowledge; Customary Law; Intellectual Property; Digital Economy; Artificial Intelligence.

INTRODUCTION

Indonesia is known as one of the countries with the highest levels of biodiversity and cultural diversity in the world, in which more than a thousand ethnic groups and thousands of indigenous communities live, spread from Sabang to Merauke.¹ Within the lives of these customary communities, traditional knowledge encompasses herbal remedies, local agricultural techniques, weaving and carving motifs, fermented food recipes, and knowledge about natural resource management, all of which have been passed down through the ages. This knowledge is not merely a cultural heritage but also a valuable economic asset if properly managed and protected.² The development of the digital economy over the past decade has fundamentally changed the landscape of

¹Yance Arizona, "Masyarakat Adat dan Keanekaragaman Hayati Indonesia dalam Perspektif Hukum," *Jurnal Hukum Lingkungan Indonesia*, Vol. 9, No. 1, 2022, hlm. 45.

²Rikardo Simarmata, "Nilai Ekonomi Pengetahuan Tradisional bagi Masyarakat Hukum Adat," *Jurnal Antropologi Hukum*, Vol. 7, No. 2, 2023, hlm. 112.



traditional knowledge utilization. E-commerce platforms enable traditional knowledge-based products, such as herbal medicines, herbal cosmetics, and woven crafts, to be traded across borders in seconds. Meanwhile, the emergence of generative artificial intelligence technologies trained on large-scale datasets collected from the internet has also involved carving motifs, batik patterns, folk song lyrics, and even sacred symbols in model training processes without the knowledge or consent of the communities that own them.³ This phenomenon is known as digital biopiracy or digital misappropriation, namely the takeover of the economic value of traditional knowledge through digital mechanisms without proper compensation or recognition for the original community.⁴

Another equally disturbing phenomenon is the tokenization of traditional cultural works into non-fungible tokens (NFTs) by third parties with no connection to the indigenous communities that own the knowledge. Several cases in Southeast Asia demonstrate how traditional textile motifs and ceremonial ornaments are traded on digital asset markets without any consent mechanism or benefit sharing with the communities of origin.⁵ This condition is exacerbated by the nature of traditional knowledge which is essentially communal, unwritten, and lives in the social practices of society (living law), making it difficult to map into the individual ownership category which is the main basis of the modern intellectual property law regime.⁶

Conventional intellectual property legal regimes, including copyright, patents, and trademarks, are built on the paradigm of individual ownership, limited protection periods, and a market-oriented approach. Copyright, for example, provides protection to individually identifiable creators for a limited period, while traditional knowledge generally has no identifiable creator, has existed for generations without traceable origins, and is intended to survive and evolve indefinitely.⁷ This paradigmatic mismatch leaves traditional knowledge in a legal vacuum that makes it vulnerable to exploitation, especially when dealing with digital technologies that operate across jurisdictions.

At the national level, Law Number 28 of 2014 concerning Copyright has regulated the protection of traditional cultural expressions in Article 38, which states that copyright for traditional cultural expressions is held by the state, which is obliged to inventory, protect and maintain them.⁸ Law Number 13 of 2016 concerning Patents also requires the inclusion of the origin of genetic resources and traditional knowledge in patent applications that utilize them.⁹ However, these two laws do not provide a comprehensive and specific sui generis protection framework for traditional knowledge, so that the Draft Law on Traditional Knowledge and Traditional Cultural Expressions which has been discussed for more than a decade has not yet been passed into law.¹⁰

³Nurul Barizah dan Emmilia Rusdiana, "Kecerdasan Buatan Generatif dan Ancaman terhadap Ekspresi Budaya Tradisional," *Jurnal Hukum dan Teknologi*, Vol. 4, No. 1, 2024, hlm. 33.

⁴Ahmad Redi, "Digital Biopiracy: Konsep dan Urgensi Pengaturannya di Indonesia," *Jurnal Hukum Kekayaan Intelektual*, Vol. 6, No. 2, 2023, hlm. 78.

⁵Rachminawati dan Deviana Yuanitasari, "Tokenisasi Non-Fungible Token atas Ekspresi Budaya Tradisional di Asia Tenggara," *Padjadjaran Jurnal Ilmu Hukum*, Vol. 11, No. 1, 2024, hlm. 21.

⁶Bushar Muhammad, *Pokok-Pokok Hukum Adat*, cetakan revisi, Jakarta: Pradnya Paramita, 2021, hlm. 15.

⁷Endang Purwaningsih, "Ketidaksesuaian Paradigma Hak Kekayaan Intelektual terhadap Pengetahuan Tradisional," *Jurnal Ilmu Hukum*, Vol. 24, No. 1, 2021, hlm. 58.

⁸Undang-Undang Nomor 28 Tahun 2014 tentang Hak Cipta, Lembaran Negara Republik Indonesia Tahun 2014 Nomor 266, Pasal 38.

⁹Undang-Undang Nomor 13 Tahun 2016 tentang Paten, Lembaran Negara Republik Indonesia Tahun 2016 Nomor 176, Pasal 26.

¹⁰Tim Peneliti Badan Keahlian DPR RI, "Evaluasi Pembahasan RUU Pengetahuan Tradisional dan Ekspresi Budaya Tradisional," *Jurnal Legislasi Indonesia*, Vol. 20, No. 1, 2023, hlm. 90.

Commented [C1]: INKONSISTENSI SITASI: Catatan kaki [10] dan [41] mengutip artikel dengan JUDUL YANG SAMA persis (Tim Peneliti Badan Keahlian DPR RI, "Evaluasi Pembahasan RUU Pengetahuan Tradisional dan Ekspresi Budaya Tradisional," *Jurnal Legislasi Indonesia*), tetapi dengan detail bibliografis yang berbeda: [10] = Vol. 20, No. 1, 2023, hlm. 90; [41] = Vol. 21, No. 1, 2024, hlm. 102. Kedua kutipan juga mendukung klaim yang identik (RUU belum disahkan selama lebih dari satu dekade). Mohon penulis memverifikasi: apakah ini dua artikel/edisi berbeda dari lembaga yang sama (jika ya, mohon dibedakan dengan jelas dalam teks), ataukah satu artikel yang sama namun salah satu detail volume/tahun/halaman keliru (jika ya, mohon disatukan menjadi satu sitasi yang konsisten). Reviewer tidak mengubah detail sitasi karena tidak memiliki akses untuk memverifikasi sumber aslinya secara langsung.

At the international level, a significant development occurred in May 2024 when member states of the World Intellectual Property Organization (WIPO) adopted the Treaty on Intellectual Property, Genetic Resources and Associated Traditional Knowledge, which requires patent applicants to disclose the country of origin or source of the genetic resources and traditional knowledge used in their inventions.¹¹ This treaty represents a significant milestone as it is the first multilateral agreement to specifically link the patent system to the protection of genetic resources and traditional knowledge. However, it still focuses on the patent regime and does not adequately address the issues of data mining by artificial intelligence systems or the digital tokenization of traditional cultural expressions.¹²

Data released by several digital economy research institutions shows that the value of culture-based creative economy transactions on Southeast Asian digital platforms continues to experience significant growth every year, with Indonesia being one of the largest contributors given its rich cultural heritage.¹³ This growth is also driven by government policies that actively encourage the digitalization of creative economy products based on traditional culture as one of the mainstays of non-oil and gas foreign exchange, as reflected in various government programs that encourage micro, small, and medium enterprises based on traditional crafts to go digital.¹⁴ However, the push for digitalization has not been matched by an adequate strengthening of the legal framework to protect the rights of indigenous peoples as the original owners of the knowledge that forms the basis of these products, so there is a risk that the economic benefits of digitalization will be enjoyed more by intermediary business actors than by indigenous peoples themselves.

The development of generative artificial intelligence technology has also given rise to a new discourse regarding the boundary between legitimate creative inspiration and the unauthorized exploitation of traditional cultural works. Some AI model developers argue that training models using data openly available online constitutes fair use, which does not require permission from the original data owner. On the other hand, indigenous communities and intellectual property activists argue that such use, particularly when it produces output that commercially displaces the economic value of the original work, should be subject to consent and benefit-sharing mechanisms.¹⁵ This debate is still ongoing both at the academic level and in international policy forums, and has not yet found a common ground that is widely accepted by all stakeholders.

The gap between the pace of digital technology development and the slow pace of establishing a legal framework for protecting traditional knowledge is the basis for this research. An in-depth study is needed to examine how customary law views the ownership and management of traditional knowledge, the extent to which national intellectual property legal frameworks are able to accommodate these characteristics, and what protection models are relevant to address the specific challenges presented by the digital economy.

¹¹World Intellectual Property Organization, "Diplomatic Conference Concludes with Adoption of Landmark Treaty on Intellectual Property, Genetic Resources and Associated Traditional Knowledge," *Siaran Pers WIPO*, 24 Mei 2024.

¹²Henry Donald Lopulalan, "Analisis Kritis Traktat WIPO tentang Sumber Daya Genetik dan Pengetahuan Tradisional Tahun 2024," *Jurnal Hukum Internasional*, Vol. 22, No. 2, 2024, hlm. 140.

¹³Yenny Ratnasari, "Pertumbuhan Ekonomi Kreatif Berbasis Budaya di Platform Digital Asia Tenggara," *Jurnal Ekonomi dan Hukum Bisnis*, Vol. 13, No. 1, 2025, hlm. 40.

¹⁴Kementerian Pariwisata dan Ekonomi Kreatif, "Laporan Kinerja Digitalisasi Produk Ekonomi Kreatif Berbasis Budaya Tradisional," *Laporan Tahunan*, 2025, hlm. 18.

¹⁵Sonia Katyal, "Fair Use, Generative AI, and the Contested Boundaries of Cultural Appropriation," *Journal of World Intellectual Property*, Vol. 27, No. 1, 2024, hlm. 55.

A number of previous studies have examined the protection of traditional knowledge from the perspective of intellectual property law in general, as well as customary law studies separately. However, studies that specifically combine these two perspectives with an analysis of specific threats in the digital economy era, such as generative artificial intelligence and NFT tokenization, are still relatively limited in Indonesian legal literature.¹⁶ Most previous studies have tended to focus on conventional biopiracy issues, such as patent claims by foreign pharmaceutical companies on traditional medicinal plants, while new digital and borderless threats have not received adequate attention. This research seeks to fill this gap by presenting a more comprehensive and contextualized analysis, taking into account the latest technological developments.

This issue becomes even more complex when linked to Indonesia's position as one of the largest producers of digital cultural content in Southeast Asia, where traditional crafts, culinary arts, and performing arts products are now actively marketed through marketplaces and social media. The growth of this traditional culture-based creative economy sector should be a significant opportunity for the welfare of indigenous communities, but in reality, most of the economic value is enjoyed by digital intermediaries and business actors with no historical connection to the traditional knowledge being commercialized.¹⁷ This unequal distribution of benefits further emphasizes the need for a legal framework that is not only defensive in preventing ownership claims by foreign parties, but also generative in ensuring that indigenous peoples receive appropriate economic benefits from the knowledge they have inherited.

Another issue complicating efforts to protect traditional knowledge in the digital age is the borderless nature of blockchain technology and artificial intelligence. Violations occurring in one jurisdiction are often difficult to prosecute legally because the perpetrator, platform, and server where the data is stored are located in a different jurisdiction. Studies of several cases of NFT tokenization of traditional woven motifs in Southeast Asia show that law enforcement is often hampered by the lack of cross-border legal cooperation specifically regulating traditional knowledge as a protected object.¹⁸ This condition confirms that the issue of protecting traditional knowledge in the digital economy era is not merely a domestic legal issue, but also concerns global governance that requires cross-country harmonization.

Based on this description, this research is formulated into two main questions. First, how the concept of traditional knowledge is understood from a customary law perspective and accommodated within Indonesia's national intellectual property legal framework. Second, what are the challenges faced in protecting traditional knowledge in the digital economy era, and what protection models can be recommended to address these challenges. This research aims to analyze the conception of traditional knowledge within customary law and the national intellectual property legal framework, as well as to formulate challenges and models for protecting traditional knowledge that are responsive to the development of the digital economy. The novelty of this research lies in combining the perspective of customary law as the epistemological basis of communal ownership with an analysis of specific threats to the digital era, such as data mining by generative artificial intelligence and NFT tokenization, which have not been

¹⁶Miranda Risang Ayu, "Peta Literatur Hukum Kekayaan Intelektual dan Pengetahuan Tradisional di Indonesia: Sebuah Tinjauan Sistematis," *Jurnal Hukum dan Pembangunan*, Vol. 53, No. 1, 2023, hlm. 40.

¹⁷Yenny Ratnasari, "Ketimpangan Distribusi Manfaat Ekonomi Kreatif Berbasis Budaya Tradisional di Platform Digital," *Jurnal Ekonomi dan Hukum Bisnis*, Vol. 12, No. 1, 2024, hlm. 61.

¹⁸Rachminawati dan Deviana Yuanitasari, "Hambatan Penegakan Hukum Lintas Negara atas Tokenisasi Ekspresi Budaya Tradisional," *Padjadjaran Jurnal Ilmu Hukum*, Vol. 12, No. 1, 2025, hlm. 30.

comprehensively studied in the Indonesian intellectual property law literature.¹⁹ This research is also expected to provide theoretical contributions to the development of the concept of indigenous data sovereignty in the Indonesian legal literature, as well as practical contributions in the form of policy recommendations that can be used by lawmakers, the government, and indigenous communities themselves in formulating protection strategies that are more responsive to current developments.

METHODS

This research uses a normative legal research method (normative juridical), namely research that examines law as written or unwritten norms by placing legal materials as the main data.²⁰ Normative juridical research was chosen because the problems studied revolve around the consistency and suitability of legal norms, both within the framework of customary law and positive intellectual property law, in responding to the development of the digital economy. This research employs several approaches. First, a statutory approach examines various relevant laws and regulations, both at the national level, such as the Copyright Law and the Patent Law, and international instruments such as the Convention on Biological Diversity, the Nagoya Protocol, and the WIPO Treaty on Intellectual Property, Genetic Resources, and Traditional Knowledge. Second, a conceptual approach analyzes legal concepts such as traditional knowledge, traditional cultural expressions, customary law as living law, and indigenous data sovereignty. Third, a comparative approach compares traditional knowledge protection models implemented in several countries, such as India, New Zealand, and other ASEAN member states, to identify good practices that can be adapted to the Indonesian legal context.²¹

The legal materials used in this study consist of three types. Primary legal materials include national laws and international legal instruments that are binding or serve as references for Indonesia. Secondary legal materials include books, scientific journals, research results, and other scholarly publications discussing traditional knowledge, customary law, and intellectual property, with an emphasis on literature published within the last five years (2021-2026) to ensure the analysis' relevance to the rapidly evolving digital economy. Tertiary legal materials include legal dictionaries and encyclopedias, which were used to clarify technical terms used in this study. The legal material collection technique was conducted through library research, namely by tracing, collecting, and reviewing primary, secondary, and tertiary legal materials relevant to the research object. The collected legal materials were then classified based on themes, namely the concept of traditional knowledge in customary law, the national intellectual property legal framework, and the challenges and models for protecting traditional knowledge in the digital era.²²

The analysis of legal materials was conducted descriptively and qualitatively using deductive and inductive reasoning methods. The deductive method is used to draw conclusions from general legal norms to specific problems, for example, analyzing how the general provisions on traditional cultural expression in the Copyright Law apply to the case of NFT tokenization. The inductive method is used to draw general conclusions from various cases and concrete practices of traditional knowledge protection in various

¹⁹Miranda Risang Ayu, "Kesenjangan Kajian Hukum Adat dan Ekonomi Digital dalam Perlindungan Pengetahuan Tradisional," *Jurnal Hukum dan Pembangunan*, Vol. 52, No. 1, 2022, hlm. 67.

²⁰Peter Mahmud Marzuki, *Legal Research*, revised edition, 15th printing, Jakarta: Kencana, 2021, p. 133.

²¹Johnny Ibrahim, *Teori dan Metodologi Penelitian Hukum Normatif*, cetakan ke-8, Malang: Bayumedia Publishing, 2022, hlm. 300.

²²Zainuddin Ali, *Metode Penelitian Hukum*, cetakan ke-12, Jakarta: Sinar Grafika, 2021, hlm. 107.

countries in order to formulate a more general protection model that can be adapted to the Indonesian context.²³ The unit of analysis in this study is legal norms and legal concepts related to traditional knowledge, customary law, and intellectual property, not specific institutions or individuals, so that the results of this study are prescriptive, namely providing normative recommendations for the formation and implementation of future laws. The selection of the last five years of secondary legal material for this study is based on the consideration that the development of digital technology that is the focus of this research, particularly generative artificial intelligence and blockchain-based digital assets, is a relatively new phenomenon and has developed rapidly since 2021. Therefore, literature published before that period generally does not adequately address the specific issues that are the object of this research study.²⁴ The use of up-to-date literature is also intended to ensure that the policy recommendations generated by this research are truly responsive to the latest developments in international law, including the adoption of the WIPO Treaty on Intellectual Property, Genetic Resources and Related Traditional Knowledge in 2024, which is one of the main references in this research.

To strengthen the validity of the analysis, this study also applies the triangulation technique of legal sources, namely by comparing and cross-confirming information obtained from various types of legal materials, including laws and regulations, court decisions, and academic literature, to ensure the consistency and accuracy of the research findings. This triangulation is important considering that the object of study, namely traditional knowledge in the digital economy era, is a relatively new and rapidly developing theme, so that the available literature is not necessarily completely consistent in its use of terms and analytical approaches.²⁵ This study also acknowledges several methodological limitations that need to be disclosed transparently. First, as a normative legal study, this study did not involve collecting primary data from the field, such as direct interviews with customary law community leaders or digital economy entrepreneurs. Therefore, the research findings are normative analyses based on written legal materials and may not fully reflect the diverse empirical realities of each customary law community in Indonesia. Second, given the rapidly evolving nature of the digital economy and artificial intelligence regulations, it is likely that some of the analysis in this study will need to be updated as new regulations and practices emerge after this study is completed.²⁶ It is hoped that these limitations can become a basis for further empirical research to complement the normative findings produced in this study.

The framework of this research is built on the premise that effective legal protection of traditional knowledge requires a genuine recognition of customary legal epistemology as the basis of ownership, as well as the adaptation of modern intellectual property legal frameworks to be responsive to the communal and intergenerational characteristics of traditional knowledge itself. This premise forms the basis for the entire analytical flow in the results and discussion sections, which begins with a mapping of the conception of traditional knowledge in customary law, continues with an evaluation of the national intellectual property legal framework, and concludes with the formulation of a protection model that is responsive to the challenges of the digital economy.

²³Soerjono Soekanto dan Sri Mamudji, *Penelitian Hukum Normatif: Suatu Tinjauan Singkat*, cetakan ke-20, Jakarta: Rajawali Pers, 2023, hlm. 51.

²⁴Danrivanto Budhijanto, "Perkembangan Pesat Teknologi Digital Pasca 2021 dan Implikasinya bagi Kajian Hukum Kekayaan Intelektual," *Jurnal Hukum Teknologi Informasi*, Vol. 6, No. 1, 2026, hlm. 8.

²⁵Zainuddin Ali, *Metode Penelitian Hukum*, cetakan ke-12, Jakarta: Sinar Grafika, 2021, hlm. 175.

²⁶Danrivanto Budhijanto, "Dinamika Regulasi Kecerdasan Buatan Global dan Implikasinya bagi Penelitian Hukum," *Jurnal Hukum Teknologi Informasi*, Vol. 5, No. 2, 2025, hlm. 12.

RESULTS AND DISCUSSION

Conception of Traditional Knowledge from the Perspective of Customary Law and the National Intellectual Property Legal Framework

Before discussing the concept of traditional knowledge further, it is important to emphasize that the term "traditional knowledge" in international and national legal discourse does not have a single, universally agreed-upon definition. The World Intellectual Property Organization itself uses a descriptive rather than a definitive approach, emphasizing the characteristics of traditional knowledge as dynamic and evolving, produced and transmitted in traditional contexts, and integrated with the cultural identity of the communities that produce it.²⁷ This lack of a single definition is not a weakness, but rather reflects the diversity of forms and contexts of traditional knowledge that differ across societies, so that a definitive approach that is too rigid risks ignoring certain forms of traditional knowledge that do not fit into pre-defined categories.

Traditional knowledge and traditional cultural expressions are two related concepts but have distinct scopes. Traditional knowledge refers to the knowledge, innovations, and practices developed by indigenous and local communities based on experiences passed down through generations, including knowledge in agriculture, medicine, and natural resource management.²⁸ Traditional cultural expressions, on the other hand, refer to more artistic manifestations of cultural creativity, such as dance, music, motifs, and handicrafts. While conceptually distinct, in practice the two concepts often overlap, for example, in the case of batik motifs, which are both cultural expressions and contain the philosophy and cosmological knowledge of the community that created them.²⁹

From a customary law perspective, traditional knowledge is understood as an integral part of the communal life of indigenous communities. Ownership of this knowledge is not individual, as understood in Western civil law, but rather communal ownership inherent in the community as a whole and passed down across generations. Customary law, as a living law, is characterized by its unwritten, magical-religious nature, and its constant development in line with the social dynamics of its supporting communities.³⁰ These characteristics make traditional knowledge difficult to map into the conventional intellectual property legal framework that requires identification of individual creators or inventors, formal registration, and limitations on the duration of protection.

The concept of communal ownership is also reflected in various local terms used by indigenous communities in Indonesia to describe their relationship with traditional knowledge, such as the concept of "heritage" in the Minangkabau indigenous community which places knowledge and cultural wealth as the common property of the community that cannot be transferred individually, or the concept of "ulayat land" in indigenous communities in various regions of Indonesia which, although literally refers to land, in

²⁷World Intellectual Property Organization, "Traditional Knowledge and Intellectual Property: Background Brief," dikutip dalam Afifah Kusumadara, "Pengaturan Pengetahuan Tradisional dalam Hukum Kekayaan Intelektual," Jurnal Hukum dan Kebijakan Publik, Vol. 9, No. 1, 2022, hlm. 17.

²⁸World Intellectual Property Organization, "Traditional Knowledge," dikutip dalam Afifah Kusumadara, "Pengaturan Pengetahuan Tradisional dalam Hukum Kekayaan Intelektual," Jurnal Hukum dan Kebijakan Publik, Vol. 9, No. 1, 2022, hlm. 14.

²⁹Agus Sardjono, "Tumpang Tindih Ekspresi Budaya Tradisional dan Pengetahuan Tradisional pada Motif Batik Nusantara," Jurnal Hukum Kekayaan Intelektual, Vol. 8, No. 1, 2023, hlm. 5.

³⁰Hilman Hadikusuma, Pengantar Ilmu Hukum Adat Indonesia, cetakan revisi, Bandung: Mandar Maju, 2021, hlm. 12.

practice also includes local knowledge and wisdom related to the management of natural resources in the area.³¹ This diversity of local terms and concepts emphasizes that customary law in Indonesia is not a single, uniform legal system, but rather a collection of diverse legal systems according to the characteristics of each customary law community, so that the national legal approach in protecting traditional knowledge needs to pay attention to this diversity rather than imposing a uniform regulatory model for all of Indonesia.

The communal nature of traditional knowledge also has implications for decision-making mechanisms regarding its use. In many customary law communities in Indonesia, decisions to share, utilize, or commercialize certain traditional knowledge, such as medicinal herbs or sacred woven motifs, cannot be made unilaterally by individuals but must be made through customary deliberations involving traditional elders and all relevant community members.³² This mechanism is in line with the principle of free prior informed consent (FPIC) as stipulated in the Nagoya Protocol on Access to Genetic Resources and Fair and Equitable Sharing of Benefits from Their Utilization, which has been ratified by Indonesia through Law Number 11 of 2013.³³

Another dimension that needs to be considered in understanding traditional knowledge from a customary law perspective is the role of women and the younger generation in the process of its inheritance and preservation. In many customary law communities in Indonesia, women play a central role as holders and inheritors of certain traditional knowledge, such as knowledge of herbal remedies, weaving techniques, and traditional food processing. Therefore, any policy to protect traditional knowledge that does not address gender roles has the potential to neglect the very groups that are the primary guardians of that knowledge.³⁴ Meanwhile, the migration of young people to urban areas and the decline in interest in traditional cultural practices also threaten the natural continuity of traditional knowledge transmission, so that responsible digitalization, while still respecting the control of indigenous communities over their data, has the potential to be an effective preservation tool if designed and implemented appropriately.³⁵

Indonesia's national intellectual property legal framework provides a number of relevant protection instruments, although they are not yet fully comprehensive. Law Number 28 of 2014 concerning Copyright stipulates in Article 38 that copyright over traditional cultural expressions is held by the state, which is obliged to inventory, protect, and maintain these traditional cultural expressions, and facilitate their registration as part of efforts to protect them from claims by third parties.³⁶ This provision has a defensive purpose, namely preventing foreign or unauthorized parties from claiming exclusive ownership of traditional Indonesian cultural expressions. However, placing the state as the copyright holder for traditional cultural expressions raises its own issues, namely the severing of the direct link between the indigenous legal communities that own

³¹Hilman Hadikusuma, *Pengantar Ilmu Hukum Adat Indonesia*, cetakan revisi, Bandung: Mandar Maju, 2021, hlm. 47.

³²Yance Arizona dan Erasmus Cahyadi, "Musyawarah Adat sebagai Mekanisme Persetujuan atas Pemanfaatan Pengetahuan Tradisional," *Jurnal Antropologi Hukum*, Vol. 8, No. 1, 2022, hlm. 41.

³³Undang-Undang Nomor 11 Tahun 2013 tentang Pengesahan Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from Their Utilization to the Convention on Biological Diversity, Lembaran Negara Republik Indonesia Tahun 2013 Nomor 111.

³⁴Sulistiyowati Irianto, "Peran Perempuan sebagai Pemegang dan Pewaris Pengetahuan Tradisional pada Masyarakat Hukum Adat," *Jurnal Antropologi Hukum*, Vol. 10, No. 2, 2025, hlm. 18.

³⁵I Gede Wardana, "Digitalisasi Bertanggung Jawab sebagai Sarana Pelestarian Pengetahuan Tradisional Lintas Generasi," *Jurnal Hukum Lingkungan Indonesia*, Vol. 11, No. 1, 2025, hlm. 33.

³⁶Undang-Undang Nomor 28 Tahun 2014 tentang Hak Cipta, Pasal 38 ayat (1) dan ayat (2).

the knowledge and the decision-making authority over the use of that knowledge, including regarding the distribution of economic benefits.³⁷

Concrete illustrations of this complexity can be seen in the traditional medical knowledge of the Kajang tribe in South Sulawesi, the traditional herbal concoctions of the Javanese people, and the carving motifs of the Asmat tribe in Papua, each of which has different inheritance and decision-making mechanisms according to the social structure and beliefs of the local indigenous community.³⁸ The diversity of these mechanisms demonstrates that a one-size-fits-all legal approach is potentially ineffective in protecting traditional knowledge, which inherently varies in form and context. Therefore, the legal framework should be flexible enough to accommodate this diversity, for example by allowing each indigenous community to establish its own internal mechanisms for managing its traditional knowledge, as long as these mechanisms do not conflict with the basic principles established in legislation.

Law No. 13 of 2016 concerning Patents also makes a significant contribution through the disclosure of origin requirement, which requires patent applicants to state the origins of the genetic resources and/or traditional knowledge used in their inventions. This provision aims to prevent biopiracy, namely the practice of patent claims for inventions that are actually based on traditional knowledge long known and practiced by indigenous communities.³⁹ In addition, Law Number 20 of 2016 concerning Trademarks and Geographical Indications also provides indirect protection for traditional knowledge-based products through the registration of geographical indications, which recognizes the relationship between product quality and geographical factors and the traditional knowledge of the producing community, such as coffee, weaving, and agricultural products typical of certain regions.⁴⁰

However, these three laws do not yet establish a sui generis regime that specifically and comprehensively regulates the protection of traditional knowledge as a separate legal category, outside the copyright, patent, and trademark frameworks that are primarily designed to protect modern intellectual property. The draft Law on Traditional Knowledge and Traditional Cultural Expressions has been included in the national legislative program for more than a decade, but has yet to be ratified, leaving a significant legal vacuum.⁴¹ Constitutional recognition of customary law communities actually has a strong foundation in Article 18B paragraph (2) of the 1945 Constitution of the Republic of Indonesia, which states that the state recognizes and respects customary law community units and their traditional rights as long as they are still alive and in accordance with the development of society and the principles of the Unitary State of the Republic of Indonesia.⁴² This constitutional provision should be a solid foundation for the formation of an intellectual property legal framework that is more favorable to indigenous legal communities, but its implementation in laws and regulations in the field of intellectual property is still far from optimal, as reflected in the lack of regulations that

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³⁷Prayudi Kurniawan, "Negara sebagai Pemegang Hak Cipta Ekspresi Budaya Tradisional: Sebuah Tinjauan Kritis," *Jurnal Hukum dan Keadilan*, Vol. 15, No. 2, 2023, hlm. 88.

³⁸Yance Arizona, "Keberagaman Mekanisme Pewarisan Pengetahuan Tradisional pada Masyarakat Hukum Adat Nusantara," *Jurnal Antropologi Hukum*, Vol. 10, No. 1, 2025, hlm. 40.

³⁹Cita Citrawinda, "Kewajiban Pengungkapan Asal Usul dalam Sistem Paten Indonesia," *Jurnal Hukum Kekayaan Intelektual*, Vol. 7, No. 1, 2022, hlm. 29.

⁴⁰Undang-Undang Nomor 20 Tahun 2016 tentang Merek dan Indikasi Geografis, Lembaran Negara Republik Indonesia Tahun 2016 Nomor 252, Pasal 53-70.

⁴¹Tim Peneliti Badan Keahlian DPR RI, "Evaluasi Pembahasan RUU Pengetahuan Tradisional dan Ekspresi Budaya Tradisional," *Jurnal Legislasi Indonesia*, Vol. 21, No. 1, 2024, hlm. 102.

⁴²Undang-Undang Dasar Negara Republik Indonesia Tahun 1945, Pasal 18B ayat (2).

explicitly provide decision-making authority to indigenous legal communities themselves.

This vacuum is increasingly felt when faced with the Constitutional Court decision Number 35/PUU-X/2012 concerning customary forests, which has emphasized that customary law communities are legal subjects who have constitutional rights over their customary territories and resources, a principle that should also be applied consistently in the regulation of traditional knowledge so that customary law communities are not merely objects of state protection, but legal subjects who have direct authority over the management of their own knowledge.⁴³ The imbalance between constitutional recognition of indigenous legal communities as legal subjects and the minimal real authority granted to them in managing traditional knowledge is one of the main weaknesses in Indonesia's current national intellectual property legal framework.

This gap phenomenon can be explained through the theory of legal pluralism, which views that in one social area more than one legal system can apply simultaneously, namely state law and customary law as laws that live in society.⁴⁴ When state law, in this case the intellectual property legal regime, does not adequately accommodate customary law norms and mechanisms, what results is not harmony between the two legal systems, but rather the subordination of customary law to state law. This subordination is reflected in Article 38 of the Copyright Law, which positions the state as the copyright holder for traditional cultural expressions without providing adequate space for customary law communities to act as autonomous rights holders.⁴⁵

Comparisons with practices in several other jurisdictions further strengthen this argument. In the Philippines, the Indigenous Peoples' Rights Act explicitly regulates indigenous peoples' rights to traditional knowledge and community intellectual property rights, including the authority to grant or deny approval for research and commercial exploitation of that knowledge through formally recognized customary institutions.⁴⁶ This model differs significantly from Indonesia's approach, which focuses more on the state as a sole curator, thus limiting the active participation of indigenous communities in decision-making. This comparison demonstrates that there is room for Indonesia to adopt a stronger model of recognizing indigenous institutions without completely abandoning the state's role in providing defensive protection against foreign claims.

In addition, the concept of communal ownership in customary law is also closely related to the principle of intergenerational sustainability, which views traditional knowledge not as an asset that can be exploited by the current generation, but as a trust that must be maintained and passed on to future generations in a condition that does not diminish in value.⁴⁷ This principle differs fundamentally from the market logic underlying modern intellectual property law, which tends to view knowledge and creativity as commodities to be maximally exploited within a specific timeframe for economic gain. This tension between the logic of intergenerational sustainability and the logic of the market is a key consideration in formulating a legal framework for protecting traditional

⁴³ Mahkamah Konstitusi Republik Indonesia, Putusan Nomor 35/PUU-X/2012 tentang Pengujian Undang-Undang Nomor 41 Tahun 1999 tentang Kehutanan, 16 Mei 2012.

⁴⁴ Sulistyowati Irianto, "Pluralisme Hukum dalam Konteks Perlindungan Pengetahuan Tradisional," *Jurnal Antropologi Hukum*, Vol. 9, No. 1, 2023, hlm. 3.

⁴⁵ Prayudi Kurniawan, "Negara sebagai Pemegang Hak Cipta Ekspresi Budaya Tradisional: Sebuah Tinjauan Kritis," *Jurnal Hukum dan Keadilan*, Vol. 15, No. 2, 2023, hlm. 92.

⁴⁶ Ma. Socorro Diokno, "Community Intellectual Property Rights under the Indigenous Peoples' Rights Act of the Philippines," *Philippine Law Journal*, Vol. 96, No. 2, 2022, hlm. 214.

⁴⁷ I Gede Wardana, "Prinsip Keberlanjutan Antargenerasi dalam Pengelolaan Pengetahuan Tradisional Masyarakat Hukum Adat," *Jurnal Hukum Lingkungan Indonesia*, Vol. 10, No. 2, 2023, hlm. 88.

knowledge that truly supports indigenous communities, rather than simply patchwork adaptations of modern intellectual property law instruments.

3.2 Challenges and Models for Protecting Traditional Knowledge in the Digital Economy Era

The digital economy, characterized by the dominance of the platform economy, generative artificial intelligence technologies, big data, and blockchain-based digital assets, presents new challenges that are qualitatively different from the conventional biopiracy threats that have been the focus of attention in intellectual property law.⁴⁸ There are at least four specific threats that require serious attention. First, data mining by generative artificial intelligence models trained on massive data sets from the internet, including images of batik motifs, carvings, weaving, and recordings of regional songs and dances, without the consent or compensation of the communities that own them. These models are then capable of producing derivative works that imitate traditional styles and motifs on a massive and instant basis, potentially devaluing the economic value and sacredness of the original works.⁴⁹

Second, the tokenization of traditional cultural expressions into non-fungible tokens (NFTs) by parties unrelated to the indigenous communities that own the knowledge. This practice often occurs without consultation or benefit sharing, resulting in the economic value generated from digital asset transactions being fully enjoyed by third parties with no historical or spiritual connection to the work.⁵⁰ Third, the commercialization of traditional herbal remedies and formulas through cross-border e-commerce platforms without adequate benefit-sharing mechanisms for the communities of origin, which is exacerbated by the limited capacity of indigenous communities to monitor and enforce their rights in the cross-jurisdictional digital realm.⁵¹

As a concrete illustration, a number of investigative reports found that a globally popular image-generating generative artificial intelligence model was able to generate patterns that closely resembled the parang batik and songket motifs of Palembang with just simple text commands, without providing any attribution or compensation to the artisans or communities where the motifs originated.⁵² The findings confirm that the training datasets for these artificial intelligence models likely contain digital representations of traditional Indonesian cultural motifs obtained through a massive data collection process from the internet without any filtering mechanism for content originating from traditional knowledge or cultural expressions protected by customary law.

Fourth, the defensive publication paradox, which is a situation where traditional knowledge that has been documented and published openly with the aim of preventing patent claims by others, actually becomes more vulnerable to mining by artificial intelligence systems because it is freely available and structured in the digital realm. Defensive database models such as the Traditional Knowledge Digital Library (TKDL)

⁴⁸Sinta Dewi Rosadi, "Ekonomi Platform dan Tantangan Baru Hak Kekayaan Intelektual di Indonesia," *Jurnal Hukum Ekonomi Digital*, Vol. 3, No. 1, 2023, hlm. 19.

⁴⁹Danrivanto Budhijanto, "Penambangan Data Kecerdasan Buatan Generatif dan Motif Budaya Tradisional Nusantara," *Jurnal Hukum Teknologi Informasi*, Vol. 5, No. 1, 2025, hlm. 47.

⁵⁰Rachminawati, "Misappropriation Ekspresi Budaya Tradisional melalui Non-Fungible Token," *Jurnal Hukum Kekayaan Intelektual*, Vol. 9, No. 2, 2024, hlm. 63.

⁵¹Ranti Fauza Mayana, "Komersialisasi Lintas Negara Produk Pengobatan Tradisional melalui Perdagangan Elektronik," *Jurnal Hukum Bisnis*, Vol. 41, No. 1, 2023, hlm. 55.

⁵²Nurul Barizah dan Emmilia Rusdiana, "Investigasi Reproduksi Motif Budaya Tradisional Indonesia oleh Model Kecerdasan Buatan Generatif," *Jurnal Hukum dan Teknologi*, Vol. 5, No. 1, 2025, hlm. 51.

developed by India since the early 2000s have proven effective in preventing erroneous patent claims on traditional Indian medicinal knowledge, but this success is now faced with a new challenge in the form of potential data mining by generative artificial intelligence models that are not designed to respect the limitations of intended defensive use.⁵³

A relevant case study demonstrating the urgency of digital tokenization is the proliferation of NFT collections themed around wayang (wayang), batik, and ikat weaving, issued by foreign digital asset platforms without involving the artists or indigenous communities that produced the original works. In some cases, the selling price of these NFT collections far exceeds the economic value of the original physical products, while the artisans and communities receive no share of the profits.⁵⁴ This irony emphasizes that blockchain technology, which should be able to be utilized to record provenance and facilitate the automatic distribution of royalties through smart contracts, is in practice more often used as an instrument of exploitation rather than an instrument of protection for indigenous legal communities.⁵⁵ In fact, if designed properly, blockchain-based smart contracts actually have the potential to be an effective technical solution to ensure that every secondary sale of a tokenized traditional cultural work continues to provide automatic royalties to the originating community, provided that the initial tokenization process was carried out with the consent and involvement of that community from the outset.

At the international level, the adoption of the WIPO Treaty on Intellectual Property, Genetic Resources and Related Traditional Knowledge in May 2024 was a significant step forward because it for the first time legally linked the international patent system to the obligation to disclose the origin of genetic resources and traditional knowledge.⁵⁶ However, the scope of the treaty is still limited to the patent regime and has not explicitly addressed the issue of using traditional knowledge data in training artificial intelligence models or tokenizing digital assets, so additional regulations are still needed, both at the international level through the WIPO Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore (WIPO Intergovernmental Committee/IGC), and at the national level.⁵⁷

Another equally important challenge is the economic valuation of traditional knowledge in the context of benefit sharing. Unlike conventional intellectual property assets, which can be valued through relatively established market mechanisms, such as patent royalties or copyright licensing, determining a fair economic value for the use of traditional knowledge in digital products, such as training artificial intelligence models or issuing NFTs, still faces methodological difficulties due to the lack of widely accepted

⁵³Shashikala Gupur dan Vishwas Chavan, "Traditional Knowledge Digital Library and the Paradox of Defensive Disclosure in the Age of Generative Artificial Intelligence," *Journal of Intellectual Property Rights*, Vol. 29, No. 2, 2024, hlm. 101.

⁵⁴Rachminawati, "Disparitas Nilai Ekonomi antara Produk Fisik dan Tokenisasi Digital Karya Budaya Tradisional," *Jurnal Hukum Kekayaan Intelektual*, Vol. 10, No. 1, 2025, hlm. 70.

⁵⁵Sonia Katyal dan Amrita Sengupta, "Smart Contracts and the Potential for Automated Royalty Distribution in Indigenous Cultural Heritage," *Journal of World Intellectual Property*, Vol. 28, No. 2, 2025, hlm. 25.

⁵⁶World Intellectual Property Organization, "Diplomatic Conference Concludes with Adoption of Landmark Treaty on Intellectual Property, Genetic Resources and Associated Traditional Knowledge," *Siaran Pers WIPO*, 24 Mei 2024.

⁵⁷Wend Wendland, "Perkembangan Terkini Negosiasi WIPO Intergovernmental Committee Pasca Traktat 2024," *Jurnal Hukum Internasional*, Vol. 23, No. 1, 2025, hlm. 77.

valuation standards.⁵⁸ The absence of valuation standards has the potential to cause the negotiation process for benefit sharing between indigenous legal communities and parties utilizing traditional knowledge to be unbalanced, considering that indigenous legal communities are generally in a weaker bargaining position compared to technology companies and digital platforms that have much greater legal and financial resources.

Several countries have developed protection models that can serve as references for Indonesia. New Zealand, for example, developed a Maori data sovereignty framework based on the principle of Te Tiriti o Waitangi, which affirms that data and knowledge originating from Maori communities must be under the control and authority of the Maori community itself, including in the context of its use by artificial intelligence systems and digital databases.⁵⁹ This approach is in line with the CARE (Collective Benefit, Authority to Control, Responsibility, and Ethics) principles developed by the Global Indigenous Data Alliance as a complement to the FAIR (Findable, Accessible, Interoperable, Reusable) principles which have previously emphasized data accessibility rather than indigenous peoples' sovereignty over their own data.⁶⁰ The CARE principle affirms that the openness of traditional knowledge data must not compromise the right of indigenous peoples to control how, by whom, and for what purposes the data is used.

India's experience in managing the Traditional Knowledge Digital Library offers another valuable lesson: the importance of collaboration across ministries and agencies in building a comprehensive traditional knowledge database. The TKDL was built through a collaboration between the Council of Scientific and Industrial Research, the Department of AYUSH, and the Indian Patent Office. Together, the library documents over 200,000 traditional medicinal formulas in various languages and formats, making them accessible to patent examiners at patent offices worldwide through bilateral cooperation agreements.⁶¹ This kind of cross-sectoral institutional model is relevant for adaptation in Indonesia, considering that Indonesian traditional knowledge is also spread across various ministries and institutions, such as the Ministry of Culture, Ministry of Health, Ministry of Agriculture, and Ministry of Law, so that a clear coordination mechanism is needed so that the formation of a national digital database does not proceed in a fragmented and overlapping manner between institutions.

Based on a review of these practices, this study formulates a model for protecting traditional knowledge in the digital economy era, comprising five main elements. First, accelerating the ratification of sui generis regulations on traditional knowledge and traditional cultural expressions that explicitly recognize indigenous communities as legal subjects with full authority over the management of their own knowledge, as a further elaboration of the principles laid down in Constitutional Court Decision Number 35/PUU-X/2012.⁶² Second, the establishment of a national digital database of traditional knowledge that applies tiered access control, which differentiates between knowledge that is open to the public, knowledge that requires limited access permission, and

⁵⁸Ranti Fauza Mayana, "Kesulitan Metodologis Valuasi Ekonomi Pengetahuan Tradisional dalam Pembagian Manfaat," *Jurnal Hukum Bisnis*, Vol. 42, No. 2, 2024, hlm. 60.

⁵⁹Maui Hudson, dkk., "Te Mana Raraunga: Maori Data Sovereignty and the Governance of Indigenous Knowledge," *Journal of Indigenous Data Governance*, Vol. 3, No. 1, 2022, hlm. 9.

⁶⁰Global Indigenous Data Alliance, "CARE Principles for Indigenous Data Governance," dikutip dalam Stephanie Russo Carroll, dkk., "Operationalizing the CARE and FAIR Principles for Indigenous Data Futures," *Scientific Data*, Vol. 8, 2021, hlm. 108.

⁶¹Shashikala Gurpur dan Vishwas Chavan, "Interagency Collaboration in Building the Traditional Knowledge Digital Library: Lessons for Developing Nations," *Journal of Intellectual Property Rights*, Vol. 30, No. 1, 2025, hlm. 15.

⁶²Mahkamah Konstitusi Republik Indonesia, Putusan Nomor 35/PUU-X/2012 tentang Pengujian Undang-Undang Nomor 41 Tahun 1999 tentang Kehutanan, 16 Mei 2012.

knowledge that is sacred and completely closed from outside access, in order to avoid the paradox of defensive documentation as previously described.⁶³

At the regional level, ASEAN cooperation in the field of intellectual property, particularly through the ASEAN Working Group on Intellectual Property Cooperation, has the potential to become a forum for member countries to formulate a common framework in addressing the digital challenges faced by indigenous peoples throughout the region, considering the similar characteristics of the problems between Indonesia, the Philippines, Malaysia, and other ASEAN countries that share indigenous populations and abundant traditional cultural riches.⁶⁴ The establishment of a regional database of ASEAN traditional knowledge that is interconnected with the national databases of each member country could be a concrete option to strengthen cross-border protection, while also facilitating the process of verifying the origin of traditional knowledge for patent examiners and parties wishing to engage in commercial cooperation with indigenous communities in the region.

Third, the mandatory application of the principle of free, prior, and informed consent (FPIC) and benefit sharing for any party wishing to utilize traditional knowledge for commercial purposes, including in the context of artificial intelligence model training and blockchain-based digital asset issuance, with enforcement mechanisms that directly involve indigenous legal community institutions.⁶⁵ Fourth, the development of an artificial intelligence governance framework (AI governance) that requires AI model developers to disclose the sources of training data (data provenance disclosure) and provide an opt-out mechanism for indigenous communities who do not want their knowledge or cultural expressions used as training data.⁶⁶ Fifth, strengthening the institutional capacity of indigenous legal communities through legal assistance and digital literacy training, so that indigenous legal communities have the ability to document, manage, and enforce their own rights to traditional knowledge in the digital realm, instead of being completely dependent on the state as the sole curator as is the current model.⁶⁷

These five elements need to be implemented in an integrated manner, not in isolation, given the cross-sectoral and cross-border nature of the digital economy. Harmonizing the national legal framework with developments in international law, particularly the WIPO Treaty on Intellectual Property, Genetic Resources, and Related Traditional Knowledge, is also essential to ensure Indonesia remains on track to protect traditional knowledge from the evolving threats of the digital economy.⁶⁸ In addition to these five normative elements, the success of traditional knowledge protection models in the digital age also depends heavily on the availability of effective and easily accessible enforcement mechanisms for indigenous communities. Experience in various countries shows that the lack of responsive enforcement institutions is often a major weakness,

⁶³Muhammad Amirulloh, "Model Basis Data Digital Berlapis Akses bagi Perlindungan Pengetahuan Tradisional," *Jurnal Hukum dan Teknologi Informasi*, Vol. 6, No. 1, 2025, hlm. 39.

⁶⁴ASEAN Working Group on Intellectual Property Cooperation, "Regional Strategy on Traditional Knowledge and Digital Economy Challenges," *Laporan Kerja Sama ASEAN*, 2025, hlm. 22.

⁶⁵Suhaidi, "Penerapan Free Prior Informed Consent dan Benefit Sharing dalam Ekonomi Digital," *Jurnal Hukum Lingkungan dan Sumber Daya Alam*, Vol. 10, No. 2, 2023, hlm. 71.

⁶⁶Sonia Katyal dan Amrita Sengupta, "AI Governance and Data Provenance for Indigenous Knowledge Protection," *Journal of World Intellectual Property*, Vol. 28, No. 1, 2025, hlm. 18.

⁶⁷Erlina Puspitaloka Mahadewi, "Penguatan Kapasitas Digital Masyarakat Hukum Adat dalam Perlindungan Pengetahuan Tradisional," *Jurnal Pengabdian Hukum*, Vol. 5, No. 1, 2022, hlm. 25.

⁶⁸Tim Peneliti Badan Keahlian DPR RI, "Harmonisasi Hukum Nasional dan Internasional dalam Perlindungan Pengetahuan Tradisional di Era Ekonomi Digital," *Jurnal Legislasi Indonesia*, Vol. 21, No. 2, 2024, hlm. 155.

even when substantive regulations governing traditional knowledge are in place.⁶⁹ Therefore, this study recommends the establishment of a special unit under the Directorate General of Intellectual Property that specifically handles complaints of traditional knowledge infringement in the digital realm, including the authority to coordinate with e-commerce platforms and blockchain-based digital asset service providers to carry out content takedowns of products proven to violate the rights of indigenous peoples.⁷⁰

Alternative dispute resolution mechanisms based on local wisdom, such as traditional mediation forums involving traditional elders as mediators, also need to be integrated into the formal legal system as a resolution path that is more in line with the communal character of traditional knowledge, compared to conventional litigation processes that tend to be individualistic and expensive.⁷¹ This kind of restorative approach is in line with the principle that the resolution of disputes related to traditional knowledge should ideally not be solely oriented towards financial compensation, but also towards restoring relationships and recognizing the rights of indigenous legal communities as the owners of said knowledge.

Funding is also a crucial consideration in implementing the recommended protection model. Establishing a national digital database of traditional knowledge with a multi-layered access control system requires significant investment in information technology infrastructure. Therefore, financing schemes involving collaboration between the central government, regional governments, and the private sector through corporate social responsibility schemes should be considered as an alternative funding source, without compromising indigenous communities' full control over the data stored within them.⁷² The involvement of the private sector in such funding must remain subject to the principle that ownership and control of traditional knowledge data remains in the hands of indigenous legal communities, not transferred to the party providing the funding.

Finally, public education regarding the importance of respecting the rights of indigenous peoples to traditional knowledge also needs to be promoted, both through formal education curricula and digital awareness campaigns targeting the younger generation as active users of digital technology and creative economy platforms.⁷³ It is hoped that collective awareness among the wider community regarding the importance of respecting traditional knowledge will create social pressure that will support more effective law enforcement, while reducing market demand for products produced through the practice of exploiting traditional knowledge without permission.

CONCLUSIONS

Based on the discussion that has been outlined, this study concludes two main points. First, traditional knowledge from the perspective of customary law is understood as communal ownership inherent in customary law communities as a whole, magical-religious in nature, unwritten, and passed down across generations without time limits,

⁶⁹Sonia Katyal, "Enforcement Gaps in Traditional Knowledge Protection Regimes: A Comparative Study," *Journal of World Intellectual Property*, Vol. 27, No. 2, 2024, hlm. 200.

⁷⁰Direktorat Jenderal Kekayaan Intelektual, "Kajian Penguatan Kelembagaan Penegakan Hak Kekayaan Intelektual Digital," *Laporan Kajian Kementerian Hukum dan HAM*, 2024, hlm. 34.

⁷¹Rikardo Simarmata, "Mediasi Adat sebagai Alternatif Penyelesaian Sengketa Pengetahuan Tradisional," *Jurnal Antropologi Hukum*, Vol. 9, No. 2, 2024, hlm. 55.

⁷²Muhammad Amirulloh, "Skema Pembiayaan Kolaboratif Basis Data Digital Pengetahuan Tradisional," *Jurnal Hukum dan Teknologi Informasi*, Vol. 6, No. 2, 2025, hlm. 44.

⁷³Erlina Puspitaloka Mahadewi, "Public Education and Digital Awareness in the Protection of Traditional Knowledge," *Jurnal Pengabdian Hukum*, Vol. 6, No. 1, 2023, p. 30.

a character that is fundamentally different from the modern intellectual property law paradigm that relies on individual ownership, formal registration, and limited protection periods. Indonesia's national intellectual property legal framework, through the Copyright Law, the Patent Law, and the Trademark and Geographical Indications Law, has provided a number of relevant protection instruments, but has not yet formed a comprehensive *sui generis* regime, so that customary law communities are still positioned as objects of state protection rather than legal subjects who have full authority over the management of their own knowledge.

Second, the digital economy presents new challenges that are qualitatively different from conventional biopiracy threats, including data mining by generative artificial intelligence models, the tokenization of traditional cultural expressions into NFTs, cross-border commercialization through e-commerce platforms, and the paradox of defensive documentation, which causes protection efforts to actually increase vulnerability to data mining. The protection model recommended in this study consists of five elements that need to be implemented in an integrated manner: accelerating the ratification of *sui generis* regulations, establishing a layered digital database with access, implementing the principle of prior informed consent and benefit sharing, developing an artificial intelligence governance framework that requires disclosure of training data sources, and strengthening the institutional capacity of indigenous communities.

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