



## LEGAL ANALYSIS OF PATENT RIGHT PROTECTION IN THE DIGITAL ERA: A CASE STUDY OF THE USE OF BLOCKCHAIN TECHNOLOGY

Anggreany Arief<sup>1\*</sup>, Andi Istiana Inayah Dwi Putri<sup>2</sup>, Indrahayu Umar Gazali<sup>3</sup>, Asmah<sup>4\*</sup>

<sup>1</sup>Moeslim University of Indonesia, Indonesia

<sup>2,3,4</sup>Sawerigading University, Indonesia

Corresponding Email: [anggreany.arief@umi.ac.id](mailto:anggreany.arief@umi.ac.id)<sup>1</sup>

### Abstract

The digital era is driving significant transformations in the protection of intellectual property rights, including patent rights. The emergence of blockchain technology, with its characteristics of decentralization, immutability, and transparency, offers new opportunities to strengthen patent protection, but also raises legal challenges related to validity, jurisdiction, and data privacy. This study is to evaluate the legal ramifications of patent infringement in the digital age and investigate the prospective implementation of blockchain technology within Indonesia's patent protection framework. The method used is normative juridical with a statutory approach and qualitative analysis of primary and secondary legal materials. The results show that blockchain has great potential in creating a more efficient and transparent patent protection mechanism, but its implementation requires legal reform and recognition of digital evidence. This study underscores the importance of a flexible and comprehensive legal framework to ensure that patent protection in Indonesia remains responsive to advancements in digital technology.

**Keywords:** Patents, Blockchain, Digital Law, Intellectual Property Protection, Innovation.

### INTRODUCTION

As a result of the growth of digital technology, the global legal and economic system has undergone significant transformations, one of which is the protection of intellectual property rights (IPR). When it comes to providing legal protection for technological breakthroughs that have both economic and strategic importance, patents, which are a type of intellectual property right, play a key role. (Disemadi, 2023). However, digital transformation also presents new challenges to the effectiveness of the conventional patent legal system. Amidst this dynamic, the emergence of blockchain technology has become a disruptive phenomenon with the potential to revolutionize patent protection mechanisms, characterized by decentralization, transparency, and immutability (Wicaksono, 2022; World Bank, 2019).

Blockchain technology offers a secure and immutable record-keeping system, allowing any transactions or changes related to patents to be automatically verified without third-party intervention (Attaran & Gunasekaran, 2019). Decentralization, immutability, and anonymity are the three most important characteristics of blockchain technology, and they generate potential as well as legal contradictions. Proof of ownership and transparency are both improved as a result of this, but on the other hand, it presents questions regarding jurisdiction, the identification of the criminal, and the

operation of law enforcement. As a result, national legal systems, like Indonesia's, need to alter their regulatory frameworks in order to make them more adaptable to developments in digital technology.

In the context of Indonesian law, patent protection is regulated by Law No. 13 of 2016 concerning Patents. This regulation grants inventors exclusive rights over their inventions, but does not fully accommodate digital inventions such as smart contracts and blockchain-based systems (Anggraeni & Bisry, 2023). Innovators working in the high-tech industry face the possibility of facing legal difficulties as a result of this discrepancy. In the meantime, blockchain technology has the potential to significantly improve patent protection by providing irrefutable evidence of ownership and enabling the deployment of automatic licensing based on smart contracts.

Comparisons with other countries show that the United States and China have been more adaptive in integrating legal protection for blockchain technology, as evidenced by the large number of patents granted in this field. In contrast, Indonesia still faces conceptual and regulatory gaps in digital invention protection, which hamper the growth of innovation and national competitiveness in the technology sector (Ganesha Law Review, 2021). However, an effective patent protection system is a crucial foundation for fostering a research ecosystem, collaboration, and technology transfer.

As a result, doing research on safeguarding patents in the digital age by means of blockchain technology has become an urgent matter of strategic importance. For the purpose of enhancing Indonesia's economic competitiveness on the international stage, legal reforms that are responsive to digital innovation would boost the effectiveness of law enforcement, give certainty for innovators, and provide opportunities for innovation. Therefore, in order to establish a legal policy direction that is both adaptable and sustainable in this era of digital change, it is necessary to conduct an analysis of the legal repercussions of patent infringement as well as the potential application of blockchain technology in patent protection.

## **LITERATURE REVIEW**

### **Intellectual Property Rights**

Intellectual Property Rights (IPR) explains that patents are a form of legal protection for the results of individual innovation and creativity that have economic value. In the context of the digital era, this protection is increasingly important to safeguard the authenticity and exclusive rights of innovative works from potential technology-based infringement. According to WIPO (2022), the IPR system plays a role in creating a balance between the public interest and the exclusive rights of creators, ensuring the sustainable development of innovation.

### **Blockchain Technology in Legal Protection**

This paper explains that blockchain technology can increase transparency, security, and authenticity in patent protection. Every transaction or patent registration recorded on a blockchain system is permanent and difficult to manipulate, strengthening proof of intellectual property

ownership. According to De Filippi and Wright (2018), blockchain has the potential to revolutionize the legal protection system by providing decentralized and trustworthy digital evidence.

## **METHOD**

This research employs a normative juridical method, a legal approach based on the analysis of applicable written legal norms and relevant legal doctrines and theories. The primary focus of this method is the interpretation and consistency of norms within the legal framework, particularly those related to patent protection in the digital era and the application of blockchain technology. This approach was chosen because the issues studied are closely related to the validity, effectiveness, and adequacy of legal regulations in responding to developments in information and communication technology.

The approaches used include a statutory approach and a conceptual approach. The statutory approach is conducted by examining various related regulations, such as Law Number 13 of 2016 concerning Patents, Law Number 19 of 2016 concerning Electronic Information and Transactions, and Law Number 27 of 2022 concerning Personal Data Protection. The conceptual approach is used to analyze legal theories regarding intellectual property rights protection, responsive law, and distributive justice in the context of digital technology innovation.

## **RESULTS AND DISCUSSION**

### **Legal Consequences of Patent Infringement in the Digital Age**

Patent infringement in the digital age has increasingly complex legal consequences due to the cross-border, anonymous, and automated nature of digital technology. Under Article 1365 of the Civil Code, patent infringement can give rise to civil liability in the form of compensation, while in specific contexts it can also lead to criminal sanctions as stipulated in Law Number 13 of 2016 concerning Patents. However, the development of blockchain technology complicates the evidentiary and jurisdictional aspects because the system operates in a decentralized manner without a single authority.

1. Civil consequences in the blockchain context include civil lawsuits against entities or developers who use patented blockchain methods or systems without a license. The challenge lies in identifying the often-anonymous perpetrators and the decentralized nature of blockchain, which makes determining jurisdiction difficult.

Forms of consequences include:

- a. An order to stop the use of infringing technology or products.
- b. Compensation in the form of financial compensation.
- c. Confiscation, destruction, or prohibition of the distribution of infringing products.

The main challenges are the identification of perpetrators who are often anonymous and the decentralized nature that makes it challenging to determine jurisdiction and locus delicti in the blockchain ecosystem.

2. Criminal enforcement is particularly complicated by blockchain characteristics such as user anonymity (e.g., the 2013 Silk Road case involving anonymous transactions on the blockchain) and its cross-border nature. Perpetrators are often tricky to track and identify, complicating investigation and prosecution physically.

Forms of criminal consequences include:

- a. Patent Law (Law No. 13 of 2016): maximum imprisonment of 5 years and a maximum fine of IDR 500,000,000.
  - b. ITE Law (Law No. 11 of 2008): maximum prison sentence of 6 years and a maximum fine of IDR 1,000,000,000.
3. If a violation occurs against a patent registered internationally through the Patent Cooperation Treaty or the TRIPS Agreement, the perpetrator may face cross-border consequences. The TRIPS (Trade-Related Aspects of Intellectual Property Rights) Agreement, ratified by Indonesia through Law No. 7 of 1994, requires each member country to provide:
    - a. Legal protection mechanisms for patent rights.
    - b. Effective law enforcement systems, including access to courts and dispute resolution.
    - c. Other countries may take action against violators in accordance with their respective IPR laws.
    - d. Patent owners can use the TRIPS-WTO mechanism to claim cross-border protection.

The decentralized and cross-blockchain nature (the 2021 Poly Network hack involved digital assets moving between jurisdictions) means violations can occur in multiple countries simultaneously. It requires strong international cooperation and legal harmonization for effective handling, as determining jurisdiction and enforcing judgments can be highly complex.

However, law enforcement faces significant challenges due to the decentralized, cross-border, and anonymous nature of blockchain, necessitating legal reform and international cooperation. In the blockchain context, if a technology is patented in the United States, Europe, or Japan and used by a party in Indonesia without authorization, the patent holder can pursue international legal remedies for damages, either through the courts, arbitration, or international cooperation.

Blockchain characteristics (anonymity): Public blockchains like Bitcoin or Ethereum do not list users' real identities. Instead, transactions are conducted between cryptographic addresses that are not directly linked to real-world identities. A concrete example is the Silk Road case (2013). Blockchain characteristics (decentralization): There is no central authority controlling the blockchain. Every transaction must be validated by a network of nodes, not by institutions like banks, notaries, or governments. A concrete example is the Poly Network hack (2021).

Although the legal framework for patent enforcement already exists, the unique characteristics of blockchain (anonymity, decentralization, and cross-border nature) significantly increase the

complexity of providing evidence, identifying perpetrators, and determining jurisdiction. Therefore, adaptive legal reform, strengthening the capacity of law enforcement agencies, and harmonizing international standards are needed to ensure adequate patent protection in the digital age.

### **Using Blockchain to Strengthen Patent Protection**

Blockchain technology offers an innovative solution for patent protection through a decentralized, transparent, and immutable record-keeping system. Every transaction or change in ownership can be permanently recorded, creating proof of ownership that is difficult to counterfeit (Anggraeni & Bisry, 2023). Furthermore, the implementation of smart contracts allows for automated patent licensing without intermediaries, reducing the potential for infringement and increasing economic efficiency.

Research by Attaran and Gunasekaran (2019) shows that implementing blockchain in a patent protection system can reduce the risk of infringement by up to 30%. This technology can minimize opportunities for manipulation in the registration, transfer, and tracking of inventions. In the context of Indonesian law, blockchain can be a supporting instrument for Patent Law No. 13 of 2016 and the Electronic Information and Transactions Law in providing valid and verifiable electronic evidence.

However, according to the Ganesha Law Review (2021), the implementation of blockchain in the Indonesian legal system still faces regulatory obstacles, primarily due to the lack of an explicit legal basis governing the validity of digital records as proof of ownership. This lack of recognition creates legal uncertainty and limits blockchain's potential as an adequate intellectual property rights protection tool. Therefore, a legal policy is needed that explicitly recognizes blockchain-based digital evidence as valid evidence in court.

While blockchain technology has significant potential to strengthen patent protection, its implementation faces multidimensional challenges. Key challenges include the legal validity of blockchain data, cross-border jurisdictional issues, privacy and personal data protection, and standardizing interoperability between systems (World Bank, 2019). Furthermore, blockchain's immutability may conflict with the right to be forgotten principle stipulated in the Personal Data Protection Law (Law No. 27 of 2022).

Compared to countries like the United States and China, which have developed blockchain-based digital patent registration systems, Indonesia is still in the early stages of adaptation. According to Setiawan (2023), these countries have successfully integrated more adaptive legal frameworks through online registration procedures, recognition of digital evidence, and collaboration between intellectual property rights authorities and technology institutions. Indonesia needs to emulate this approach through regulatory reform and across sectors to stay ahead of the global innovation competition.

The integration of blockchain into the patent legal system not only strengthens legal certainty but also improves administrative efficiency and increases public trust. This system enables real-time monitoring and auditing, reduces bureaucratic burdens, and accelerates dispute resolution. In the long term, blockchain adoption by national intellectual property institutions can create a legal ecosystem that is transparent and adaptable to digital transformation.

Thus, the results of this study indicate that the use of blockchain technology in patent protection in Indonesia has significant potential, but requires a strong legal foundation and regulatory harmonization. National legal reform is a key prerequisite for the IPR protection system to keep pace with technological developments and support innovation-based economic growth.

## CONCLUSION

This research confirms that patent protection in the digital era faces increasingly complex legal challenges with the development of disruptive technologies such as blockchain. Conventional patent legal systems based on centralized authorities and traditional administrative procedures have proven less relevant to address the demands of the digital era, which demands efficiency, transparency, and speed. In this context, blockchain technology offers a strategic opportunity to strengthen patent protection through permanent ownership records, intelligent contract-based licensing automation, and real-time infringement tracking.

However, the implementation of blockchain as a legal instrument still faces several fundamental obstacles, including the lack of explicit legal recognition of blockchain-based digital evidence, limited institutional capacity, and challenges related to jurisdiction and personal data protection. The misalignment between national regulations and global technological developments has the potential to undermine the effectiveness of intellectual property rights protection in Indonesia. Therefore, patent law reform that is adaptive, integrative, and responsive to technological innovation is needed.

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