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BLOCKCHAIN TECHNOLOGY USAGE ON INTELLECTUAL PROPERTY RIGHTS

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Abstract. This research searches for the potential opportunities of blockchain technology in transforming intellectual property (IP) protection aspects on law and its implications for sustainable development goals, particularly those related to peace, justice, and strong institutions. By providing a transparent and immutable ledger for tracking IP ownership, blockchain offers a secure platform to combat fraud and misrepresentation in IP transactions. Additionally, smart contracts can automate IP enforcement, further enhancing protection measures and reducing human intervention. Beyond IP protection, blockchain fosters transparency in copyright ownership and transactions, facilitating fair compensation for creators and discouraging piracy through secure and traceable transactions. However, challenges such as accessibility, regulatory hurdles, and technological adoption remain significant barriers. Despite these limitations, integrating blockchain in IP protection offers transformative opportunities to establish more equitable systems, enhance trust, and streamline processes across various industries. Collaboration between stakeholders and standardized frameworks is essential for maximizing blockchain's potential in IP protection and advancing sustainable development goals. This alignment can lead to more robust and transparent institutional frameworks.

Keywords: smart contract, contract law, intellectual property, IP rights, legal agreements, blockchain technology, blockchain system.

Introduction

In its fundamental usage, a blockchain is a transparent record-keeping system that captures and traces transactions. It operates on a decentralized network where peers share and validate information. This research examines the application

of blockchain technology concerning intellectual property, specifically emphasizing smart contracts. The aim is not to explore the potential protection of the involved technologies, individual components, or applications of intellectual property rights, such as software or

databases. Instead, the focus is on determining the current and potential future impact of this technology, particularly in managing patent-protected innovations, copyrighted works, and its relevance to products developed based on such intellectual property.

Smart contract system.

The smart contract is a program written by high-level programming languages and runs on the blockchain platform, as we know. The Role of Blockchain in Intellectual Property Protection is estimated as essential. The emergence of blockchain technology has offered a promising solution to the challenges of intellectual property protection. Blockchain provides a decentralized and secure platform for recording transactions and information, making it an ideal tool for ensuring the integrity and authenticity of intellectual property rights.

Through blockchain, intellectual property can be securely registered, tracked, and verified, creating a tamper-proof record of ownership and usage rights. This not only reduces the risk of counterfeit products and piracy but also simplifies the process of licensing and royalty payments, ultimately benefiting innovators and content creators.

Moreover, the transparency and immutability of blockchain technology can strengthen the enforcement of intellectual property rights, providing a robust foundation for legal recourse in cases of infringement or unauthorized usage.

How blockchain works.

By promoting accountability, transparency, and fairness in international intellectual property, the use of blockchain technology to protect intellectual property not only promotes innovation and creativity, but also achieves development goals. Blockchain technology can be used to protect intellectual property in a transparent and distributed manner to ensure that creators are recognized and paid for their participation bases. In addition, the use of blockchain technology to protect intellectual

property can improve dispute resolution and establish a background check system, thereby reducing stress on legal institutions and improving the efficiency of intellectual property management. As blockchain continues to evolve and gain acceptance across various industries, its application in intellectual property protection is poised to revolutionize the way intellectual property rights are secured and managed. The decentralized nature of blockchain not only enhances the security and trustworthiness of intellectual property records but also facilitates cross-border protection and global recognition of rights.

Moving forward, it is imperative for stakeholders, including governments, industry players, and legal entities, to collaborate in adopting and standardizing blockchain-based solutions for intellectual property protection. This collaborative effort can contribute to the establishment of a more robust and harmonized framework for safeguarding intellectual property rights on a global scale, thereby fostering a conducive environment for sustainable development and innovation.

Revolution of Blockchain technology.

The Prospects of Blockchain Technology towards Revolutionizing IP Management: Gain insights into how blockchain can make the process of registering, tracking, and enforcing intellectual property rights more efficient and secure for creators and innovators. **Enhancing Security and Transparency in Intellectual Property Deals:** Show how a blockchain's distributed ledger technology can mitigate fraudulent activities such as copyright infringement or patent theft through an immutable recordation of ownership and usage. **Content Creation as A Means of Decentralization:** Evaluate how blockchain is capable of eliminating intermediaries in transactions that involve intellectual properties, hence allowing artists, writers, and musicians, amongst others to have power over their works while getting decent pay through smart contracts.

Leveraging blockchain for digital content monetization: Examine the potential use cases of using blockchain-based platforms to tokenize digital assets like music tracks or artworks, allowing creators to sell shares or licenses directly to consumers without traditional gatekeepers taking a significant portion of profits [1].

Addressing challenges and limitations in implementing blockchain solutions for IP protection: Delve into the obstacles that need to be overcome before widespread adoption can occur; these may include legal considerations, scalability issues within current infrastructure frameworks, or resistance from established industry players hesitant towards embracing this disruptive technology.

In conclusion, the integration of blockchain technology in intellectual property protection presents a transformative opportunity to address the challenges and gaps in the current intellectual property landscape. By embracing the potential of blockchain, stakeholders can create a more equitable, efficient, and safe network of systems dedicated to securing intellectual property so that it can support global sustainable development targets through innovation and inventiveness. The adoption of blockchain technology across industries has triggered waves of creativity and metamorphosis. Intellectual Property is one field, which is likely to benefit massively from this disruptive approach. As the world becomes increasingly digital, guarding and managing IP rights have become more intricate and convolutional. However, with blockchain's decentralized and transparent nature, it offers a promising solution for ensuring the authenticity, security, and traceability of intellectual property assets [2].

Material and methods

The emergence of blockchain technology has brought about a revolutionary approach to the field of intellectual property. With its decentralized

and immutable nature, blockchain has the potential to address some of the key challenges faced in the protection and management of intellectual property rights. This transformative technology holds the promise of revolutionizing various industries, from music and art to patents and trademarks [3].

Enhanced Copyright Protection.

An extremely useful application of blockchain in the world of copyright law is that its decentralized structure enables creators to register their original works, which promotes fairness and eliminates plagiarism. Simplified Digital Rights Management. Blockchain's decentralized nature allows digital content creators to establish smart contracts that can be used for automatic licensing enforcement, thereby simplifying royalties' management.

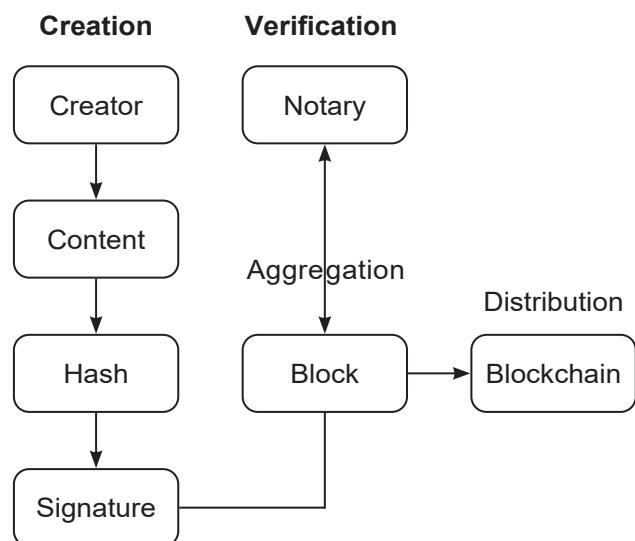


Figure: Diagram illustrating how blockchain system makes a hash and verifications

Understanding the Influence of Blockchain Technology on Intellectual Property Protection.

As the digital world changes, there is an increasing need to protect intellectual property rights. Consequently, blockchain implementation has been termed as a game changer in safeguarding and managing intellectual property in response to these challenges.

Blockchain technology, initially known for its application in cryptocurrencies, has significantly expanded its utility to various domains, including intellectual property protection [4]. Its decentralized and transparent nature provides a robust and secure platform for recording and verifying ownership, usage rights, and transactions related to intellectual property.

Through the power of blockchain, the stakeholders can be able to reduce the risks arising out of copyright violations, stealing of patents, and unlicensed distribution of innovative and creative works. The tamper-proof nature of records in blockchain guarantees that intellectual property rights are genuine and authentic in their value concerning reducing cases on counterfeit products along with piracy [5].

Furthermore, blockchain technology streamlines the process of licensing and royalty payments, providing a more efficient and transparent system for compensating innovators and content creators. This not only fosters an environment conducive to creativity and innovation but also contributes to the promotion of fairness and accountability in the global intellectual property landscape.

Legal review.

The integration of blockchain in intellectual property protection also enhances the enforcement of rights, offering a solid foundation for legal recourse in cases of infringement or unauthorized usage. This, in turn, reduces the burden on legal systems and facilitates the resolution of disputes, ultimately promoting efficiency in intellectual property management.

Moreover, the decentralized nature of blockchain technology transcends geographical boundaries, facilitating cross-border protection and recognition of intellectual property rights on a global scale. This global recognition contributes to the establishment of a harmonized framework for safeguarding intellectual property rights, fostering a conducive environment for sustainable development and innovation.

With more industries accepting blockchain technology, its emerging possibilities for use in the protection of intellectual property may streamline how our rights to intellectual properties are protected and managed [6]. It is important for stakeholders such as governments, industry, and legal to work together in adopting & standardizing blockchain-based solutions related Intellectual Property Protection. This role is crucial to strengthening and unifying IP protection across the world, creating a fair trade system for sustainable development, and promoting scientific innovation. The inclusion of blockchain technology in intellectual property protection provides a modality to change the way we view and resolve these multitude challenges and gaps that currently exist within IP. With blockchain, stakeholders can build a faster and more fair voting system that could benefit everyone involved.

Research results

The evolution of IP rights.

Intellectual property rights have a long history, dating back to the Middle Ages when guilds protected artisans and craftsmen. However, it was not until the 18th century that modern intellectual property laws began to emerge, with the first copyright laws being passed in Britain and France. These laws were designed to protect the rights of authors and publishers and were later expanded to include other forms of intellectual property, such as patents and trademarks. The internationalization of intellectual property rights has been a more recent development, with the creation of international organizations such as the World Intellectual Property Organization (WIPO) and the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement. These organizations have helped to establish common standards for intellectual property protection and enforcement and have facilitated the growth of global trade in intellectual property.

As capstones of modern innovation and creativity, intellectual property rights provide legal protection to both individuals and organizations that create expressions of ideas, which can be beneficial yet intangible. The rights we have today are experience-based and have evolved through a long-term, complex relationship with historical (e.g., economic) legal objectives. Despite the advantages of intellectual property protection, these rights have faced opposition and encountered difficulties in enforcement, which affects perceived access to and features of creativity.

Intellectual property rights have a long history, and yet there have been criticisms levied against authors of intellectual properties, such as those developed by Merlino. This essay will also address concerns about the future of our society as we become more globally connected and technologically advanced.

What are the challenges need to be solved in the future?

Despite the benefits of intellectual property protection, there have been criticisms and challenges to these rights. One key debate centers around the balance between public and private interests. While intellectual property protection can incentivize innovation and creativity, it can also limit access to knowledge and hinder the development of new ideas. Additionally, there has been criticism regarding potential changes to intellectual property laws that could shape the evolution of these rights [7]. For example, there have been calls for reform of the patent system to make it more streamlined and efficient, reducing the risk of patent trolls and other abuses of the system. Emerging technologies, such as blockchain and artificial intelligence, also have the potential to transform how intellectual property is protected and enforced.

For example, blockchain could be used to create more secure and transparent systems for managing intellectual property

rights, while AI could help identify and prevent intellectual property infringement. Additionally, the role of intellectual property in global trade and economic development is likely to remain a key issue in the years ahead. The integration of blockchain technology into various industries has sparked a wave of innovation and transformation [8]. One area that stands to benefit greatly from this revolutionary approach is intellectual property. As the world becomes increasingly digital, protecting and managing intellectual property rights has become more complex and challenging. However, with blockchain's decentralized and transparent nature, it offers a promising solution for ensuring the authenticity, security, and traceability of intellectual property assets.

Analysis of research results

Application of Blockchain in the protection of Intellectual Property.

This paper examines how a technology like blockchain could fundamentally change the way ownership of assets, such as patents, is protected and registered. By analyzing the principles of the technology, we can extend them to the processes of registering, monitoring, and safeguarding intellectual property rights, offering a more effective and secure system for IP asset owners in the legal field.

1. Explore how tokenization can enhance the creative business landscape by providing creators with direct access to clients, thereby dismantling the role of intermediaries. This approach also enables fractional ownership, allowing multiple stakeholders to invest in and benefit from a single asset.

2. The consistent and advanced use of blockchain can significantly improve the protection of intellectual property, particularly through better copyright management and the provision of concrete evidence of ownership for digital assets. This enhanced protection can help reduce piracy and misuse of intellectual property.

3. Identify concrete examples and highlight specific industries or cases that have successfully implemented blockchain solutions for intellectual property rights. Notable examples include music streaming services and dedicated online markets for digital art, among others, which illustrate effective blockchain applications in protecting and managing IP rights.

4. Evaluating potential legal frameworks for regulating blockchain-based IP protection: Synchronise and analyse the on-going legislative proceeding over propositions that could enhance and prop blockchain technologies concerning the existing IP legislation and at the same time be sensitive to the issues of privacy and compensation concerning right creators.

5. Assessing scalability challenges in implementing blockchain solutions for IP protection: It should go deeper into technological challenges which would require to be solved before the usage of such solutions at the large scale, including the transaction rate, the power consumption, integration with legacy systems, and the consensus protocols (proof of work vs proof of stake).

6. Exploring potential solutions to enhance scalability: In this paragraph, the author will review different methods which the researchers and developers are testing to tackle the scalability issues related to blockchain technology. Off-chain transactions, layer 2 protocols, sharing of the blockchain, and better consensus algorithms may be considered as such solutions. Opportunities to open up include the promotion of scalable solutions of purposes of blockchains as to meet the necessities of the IP claims throughout the worldwide area.

7. Evaluating the impact of blockchain on copyright enforcement: In this insufficient knowledge information, we shall discuss concerning the pros and cons of using blockchain for copyright enforcement. In the following analysis, we will investigate how such properties as immutability and

transparency of records could positively affect tracking and proper identification of copyrighted items, hence reducing the level of infringement and improving the possibility of correctly enforcing such rights. However, we will also speak about such issues as privacy, as with the help of blockchain various data about creators and their works can be unveiled.

8. Addressing legal and regulatory challenges: The current and potential legal and regulatory challenge that need to be overcome to incorporate blockchain technology in the intellectual property laws will be discussed in this paragraph. In the next lecture, we will consider the questions of harmonization of the IP protection and enforcement worldwide, and how this problem may be solved with the help of international cooperation. Also, it will analyze the possibilities of declaring the official rules and regulations set by governmental bodies and non-governmental organizations to protect creators' rights combined with stimulating the further development of innovations.

9. Examining the role of smart contracts in IP management: In this case, we will delve into the soft thinking of 'smart contracts' as self-executing agreements embedded on the blockchain for the radical disruption of intellectual property control. Using smart contracts, licensing, royalty payment and other contractual issues can be solved without as much problem as it is now most efficiently. However, we will look at in addition to the legal issues and complexities involved in the use of smart contracts in the area of intellectual property rights in digital area these opportunities [9].

10. Anticipating future developments and challenges: In this last section of the paper, we will highlight the possible future development in use of blockchain technology with regard to intellectual property. We will analyse specific trends, including the interaction of the blockchain with other trending technologies like artificial intelligence and the Internet

of Things regarding protection of IPs. In addition, we shall underscore the significance of continued research, partnership, and flexibility in calling into attention to new issues and challenges and in making certain that blockchain will remain a useful instrument in the protection of intellectual property right in the midst of changing landscape of the digital environment. A possible argument against continuing research, developing partnerships, and maintaining the adaptability for new issues concerning blockchain and its applicability to protect intellectual property is the issue that the blockchain itself may have flaws or weaknesses that could make blockchain's utility a hindrance within the future. For instance, it can be useful in the constant search for threats to blockchain and the development of countermeasures against them; for instance, how to protect against the so-called '51 attacks,' in which a specific cryptocurrency can be compromised in a variety of ways or how quantum computing can breach the cryptographic algorithms behind blockchain.

These can be worked around by means of further research activities and coordination with professionals in cryptography and computer science so as to support that blockchain stays a viable solution in the area of protection of IPRs. But of course, it is necessary to admit that nothing is immune to errors, and it might be that in the future some issues which can potentially threaten the full-proof security and efficiency of blockchain technology can appear despite the cooperation and research. Thus, developers and other representatives of the industry are to be always aware of possible threats and keep track of the newest possible risks and threat types.

Moreover, it is possible to use a multiple level of protection and carry out constant analysis of the blockchain network to reveal vulnerabilities and prevent them from being used. Through

continuous innovation of the technology, the blockchain community will be able to guarantee protection of the intellectual properties and continued faith in the digital world. Additionally, developers of the blockchain, professionals, and regulators are required to work hand in hand in the development of an integrated and commensurate model of security and governance in the blockchain industry. This collaborative approach can foster the sharing of best practices, the development of industry standards, and the implementation of regulatory guidelines that prioritize user protection and data privacy [10].

Moreover, ongoing research and development efforts should focus on enhancing the scalability and efficiency of blockchain networks, as well as exploring new cryptographic techniques to further strengthen the security of transactions and smart contracts. With these collective efforts, the blockchain community can not only mitigate existing risks but also anticipate and address future challenges proactively and sustainably.

Thus, by supporting the cooperation of the stakeholders involved in the creation and development of a blockchain, the community can form a set of standards that will help to prevent possible scams. That will foster trust among users and therefore increase the use of blockchain technology. In addition, constant supervision and subsequent auditing of the blockchain networks may track and counter any open entries that would compromise the integrity of the technology instance. In conclusion, focusing on the security of users and further adaptation to threats, the blockchain community will create a solid foundation for protecting people in the Internet space and ensuring further development as a whole. It will require stakeholders like developers to provide out information and examples that will increase protection. It is easy to spot and address risks at one place when there is close interaction and

information exchange in many places and on many networks. Further, enlightening the users on the possibilities of vulnerability and ensuring that those using blockchain adopt and incorporate the technology correctly enhances its security. Appreciable efforts can be made in this regard to build awareness and to incorporate measures that will help the blockchain community remain unhindered by ever-emerging challenges in the digital environment.

The Role of Blockchain Technology in Protecting Intellectual Property Rights for Sustainable Development: A Focus on Peace, Justice, and Strong Institutions. SDG.

Thus, supporting the cooperation of the stakeholders involved in the creation and development of a blockchain, the community can form a set of standards that will help to prevent possible scams. That will foster the trust among users and therefore increase the use of blockchain technology. Also, constant supervision and subsequent auditing of the blockchain networks may track and counter any open entries that would compromise the integrity of the technology instance. In conclusion, focusing on the security of users and further adaptation to threats, the blockchain community will create a solid foundation for protecting people in the Internet space and ensuring further development as a whole. It will require stakeholders like developers to provide out information and examples that will increase protection. It is easy to spot and address risks at one place when there is close interaction and information exchange in many places and on many networks. Further, enlightening the users on the possibilities of vulnerability and ensuring that those using blockchain adopt and incorporate the technology correctly enhances its security. Appreciable efforts can be made in this regard to build awareness and to incorporate measures that will help the blockchain community remain unhindered by ever-emerging challenges in the digital environment.

How does blockchain technology provide a secure and transparent platform for intellectual property rights protection?

Blockchain technology has emerged as a secure and transparent platform for intellectual property rights protection. The decentralized nature of blockchain provides a global platform for recording and verifying ownership of creative works, enabling instantaneous registration of intellectual property. Features such as immutable ledgers and smart contracts establish indisputable proof of creation and ownership, eliminating the risk of unauthorized use or disputes. This provides a tamper-proof and permanent record of IP transactions, reducing the risk of fraud and misrepresentation in IP transactions. By leveraging blockchain technology, companies can automate IP royalty payments, reducing transaction costs and increasing efficiency. Blockchain technology allows for real-time monitoring of IP rights and licensing, making the registration of IP rights more cost-effective, faster, accurate, and secure. Blockchain technology creates a transparent and immutable chain of information, simplifying the process of protecting intellectual property. It enables the development of ownership records for tracking ownership status and usage of rights, making it easier to track ownership and usage. Legislative bodies and governments globally are recognizing and integrating blockchain as compelling proof of evidence for intellectual property rights protection, indicating the effectiveness of this technology in protecting intellectual property rights. In conclusion, blockchain technology provides a secure, transparent, and efficient platform for intellectual property rights protection, strengthening the protection of unregistered IP rights.

The following are some of the properties of blockchain technology that can be valuable in guaranteeing the credibility of intellectual property rights:

There are several important characteristics of the blockchain technology

that could make the technology suitable for preventing and detecting cases of theft of intellectual property. Another very important advantage of blockchain is the possibility to defend intellectual property. Innovators and content creators not only get to benefit from the legal protection and licensing of their ideas and content. Blockchain technology has far more advantages concerning effectiveness, openness, and security than traditional ones; hence, it can be used to better protect the IPRs. Because of its distribution structure, it is also hard for the third parties to change or manipulate records of the intellectual property. Therefore, one of the advantages of blockchain is that it can guarantee the uniqueness of the rights to several types of assets by having an accurate record of ownership.

Why we need blockchain system and what outcomes we can expect from it to protect IP?

In order to completely know how the blockchain system works, we should search on the literature of blockchain-based technology using books. Many of them are very useful to find out more basic and complex ideas on the books. For example, there are very good book writers such as Marcelo Corrales, Mark Fenwick, and Helena Haapio who own books corresponding Legal Tech, Smart contracts and Blockchain technology. There are all perspectives in law, business, and innovation that we have to know about. For example, in Uzbekistan there is not any specific national research where authors could contribute all their fundamental knowledge about blockchain data analysis. Building a system like that requires identifying elements and specifying the functional structure. Codes, which follow order without fault, allow contracts to work correctly. All the data sources are visible equally to all participants of blockchain system. This is what system users have to know exactly about its functional work.

Conclusion

Thanks to the properties of the blockchain, the ownership of the IP can be tracked quite transparently and efficiently, and owing to the versatility of the application of the blockchain in the management of the IP, it is best to be considered as a significant tool for the members of the IP community. Apart from that, smart contracts as well as the computer software/algorithms can be protected under the German Patent Act and/or under the German Copyright Act, which assists in the implementation of automatic enforcement of intellectual property rights. The blockchain-based technology is also highly secure to protect the intellectual property, and since it is built with a distributed ledger of the chain of events that cannot be altered, it can effectively act against fraudulent claims to the ownership of the invention. Thus, blockchain technology can be applied in the IP space, and its application could have a global impact on IP protection and enforcement.

In what way can the application of blockchain technology help the globe achieve sustainable development goals in the aspects of peace, justice, and strong institution?

In addition to protecting intellectual property, blockchain technology can contribute greatly to attaining the sustainable development goals as relates to peace, justice, and strong institutions. It is asserted that blockchain platforms can develop open and tamper-proof chains of information within which all the players can have access, so corrupting officials and others involved in corruption can be easily identified and punished.

Further, the system constructed under blockchain can offer clear and permanent records of copyright and their sale, and it can help to pay proper royalties to the creators and thus minimize the chance of piracy. Blockchain technology is so revolutionary in the context of IP that IP

people have a reason to embark on its analysis. Some ways in which corporations can protect their inventions from being acquired or monetized by rivals include having patents over the blockchain technologies to ward off intellectual property infringement [11].

In addition, through blockchain, a creation can be dated to a particular time, thus creating a criminal proof of ownership against any case of piracy or embezzlement. Raw Copyright and patent protection as the new revolutionary protection from the blockchain technology, this will experience a great change on how creators protect as well as monetize their inventions. It is for this reason that timely protection of intellectual property rights to new developments in the field of blockchain/smart contracts should be sought if society has to become more just and sustainable.

In this research paper, emphasis has been given to how blockchain technology can be used to safeguard ownership of ideas with regard to sustainable development. As a result, they put their stamp of approval on decentralised, tamper-proof blockchain technology as the means to record and verify ownership of creative works, which minimizes the prospects of fraudulence or misrepresentation when it comes to IP transactions. In addition, there are possibilities of automating the payment of IP royalties through the use of blockchain, thus lowering the costs of the transactions and, in the process, enhancing the impacts on the sustainable development of societies. The use of blockchain technology as engaging proof for the defense of patented products also proves the efficiency of this technology for the protection of the rights of intellectual property. Enjoying such advantages, it is still possible to identify the limitations of utilizing blockchain technologies in the context of intellectual property rights protection. A constraint is that the technology being used is still

evolving; hence, it may not be in a position to reach all the different stakeholders in the network [12].

Additionally, there may be legal and regulatory challenges in the adoption of blockchain technology for IP protection. Therefore, it is important to continue researching and addressing these limitations to fully realize the potential of blockchain technology in intellectual property rights protection [13].

Overall, this paper makes a positive contribution to the development of knowledge in the protection of intellectual property rights and offers suggestion for subsequent research and application. Therefore, harnessing the benefits brought by Blockchain technology in protection of intellectual property is an exchanging for better combination and judicial improvement of the loopholes and issues experienced in the current intellectual property systems [14]. With blockchain, the stakeholders can introduce fair and effective ways of preserving innovation rights. This will result in improvement of the level of trust and, consequently, the level of transparency with regard to the work done, registration of copyrights and their licensing and, if necessary, protection. Besides, since blockchain is a decentralized system, there is no case of third parties who often cause delays and increased costs. These evidences provide solid ground to argue that the application of blockchain technology in the protection of intellectual property right has a great potentiality of promoting sustainable development espoused in the 2030 agenda, especially in areas of peace, justice, and strong institution [15]. For blockchain technology to be effective in sustaining and protecting the intellectual property rights, there must be cooperation in developing commonalities. Thus, it will bring together, standardize, and make blockchain-based solutions that are judicially admissible across different jurisdictions.

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