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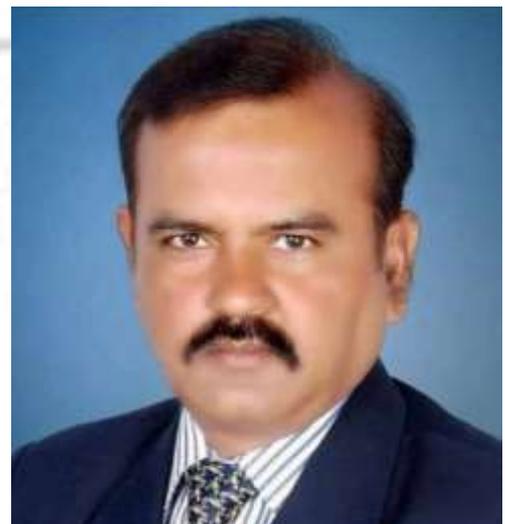
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WHITE BLACK LEGAL is an open access, peer-reviewed and refereed journal providededicated to express views on topical legal issues, thereby generating a cross current of ideas on emerging matters. This platform shall also ignite the initiative and desire of young law students to contribute in the field of law. The erudite response of legal luminaries shall be solicited to enable readers to explore challenges that lie before law makers, lawyers and the society at large, in the event of the ever changing social, economic and technological scenario.

With this thought, we hereby present to you

AI AND GREEN INNOVATION: BALANCING INTELLECTUAL PROPERTY PROTECTION AND SUSTAINABLE

AUTHORED BY - AGNES AMALA ANITHA T

& DHASS PRATHAP SINGH V M

Introduction

With its creative solutions that improve sustainability, artificial intelligence (AI) is revolutionising how societies deal with environmental issues. AI-driven solutions are increasing the efficiency and environmental friendliness of several industries, from precision agriculture and waste management to the optimisation of renewable energy systems. Because they assist lower carbon footprints, preserve natural resources, and create cleaner alternatives to conventional industrial processes, these developments are essential in the fight against climate change. Though AI-powered green technologies provide encouraging answers for a more sustainable world, intellectual property (IP) regulations frequently prevent their broad implementation. Many AI-powered ideas are patent protected, especially in the areas of smart agriculture, environmental monitoring, and renewable energy. By guaranteeing inventors financial gains, patents encourage research and development, but they also erect obstacles to accessibility. Smaller companies, researchers, and poor countries find it challenging to take advantage of these ground-breaking technology due to high licensing fees, patent monopolies, and limitations on knowledge-sharing[1]. This presents a basic problem: how can we strike a balance between the requirement for worldwide access to AI-driven sustainability solutions and IP protection? The conflict between accessibility and innovation is the problem. Strong intellectual property rights, on the one hand, promote private sector investment in R&D, guaranteeing ongoing developments in artificial intelligence and green technologies. Due to the possibility of financial loss in the absence of legal protection, businesses can be hesitant to invest in sustainable AI solutions. However, excessively stringent intellectual property regulations may hinder the spread of these vital technology, postponing international efforts to tackle climate change. Innovation and environmental advancement depend on finding a balance

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[1] Mehrotra, A. (2024). Navigating the Intellectual Property Landscape in the Age of Artificial Intelligence: Towards a Global Legal Paradigm. *International Journal of Innovations in Science, Engineering And Management*, 253-258.

between safeguarding intellectual property and guaranteeing fair access to AI-driven sustainability solutions[2]..

AI-Driven Green Innovation and Its Role in Sustainability

By maximising energy use, cutting waste, raising agricultural productivity, and improving climate monitoring, artificial intelligence (AI) is fast emerging as a major force behind sustainability. Industries can create more intelligent, effective, and ecologically friendly solutions that help mitigate climate change and conserve resources by utilising AI-powered technologies[3].

Artificial Intelligence in Renewable Energy

AI is essential to the development of renewable energy technologies, especially in the optimisation of wind and solar energy. By examining weather patterns, solar radiation, and wind speeds, AI-driven algorithms can forecast energy production, enabling improved grid management and storage options. For instance: By forecasting wind energy output 36 hours ahead of time, Google DeepMind has applied AI to increase wind farm efficiency and make it easier for power networks to incorporate wind energy. AI-powered smart grids minimise energy waste and maximise the usage of renewable energy sources by balancing the supply and demand for electricity. AI considerably lessens reliance on fossil fuels, lowering greenhouse gas emissions and fostering a greener energy transition by increasing the predictability and efficiency of renewable energy systems.

AI in the Management of Waste

A key element of sustainability is efficient trash management, and artificial intelligence (AI) has brought clever ways to reduce waste generation and enhance recycling initiatives. Among the significant innovations are: Recycling efficiency is increased by AI-powered sorting systems, like those created by AMP Robotics, which employ machine learning to recognise and separate recyclables from other debris. By predicting garbage generation trends and optimising collection routes, smart waste collection systems—such as those deployed by cities

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[2] Poddar, A., & Rao, S. R. (2024). Evolving intellectual property landscape for AI-driven innovations in the biomedical sector: opportunities in stable IP regime for shared success. *Frontiers in Artificial Intelligence*, *7*, 1372161.

[3] Varshney, Y., Dubey, D., Kumar, V., Sharma, S., & Singh, S. Enhancing Sustainable Practices through AI-Driven Green Technology.

utilising the Internet of Things (IoT) and artificial intelligence (AI)—reduce emissions and fuel usage. Artificial Intelligence (AI) helps create a circular economy, which minimises environmental contamination by increasing recycling efficiency and decreasing landfill trash.

AI in Agriculture for Sustainability

One of the sectors that uses the greatest resources is agriculture, which uses a lot of water, fertiliser, and pesticides. AI-powered precision agricultural tools provide sustainable food production by maximising crop yields and minimising resource consumption. Among the examples are: The "See & Spray" technology from Blue River Technology minimises soil and water contamination and reduces chemical use by up to 90% by using AI to identify and target weeds with herbicides. Climate AI reduces water waste by forecasting weather patterns and droughts to assist farmers in making well-informed planting decisions.

Drone monitoring systems with AI capabilities evaluate crop health and identify illnesses early, minimising the need for excessive pesticide use. These developments lessen the environmental impact of agriculture while simultaneously increasing agricultural productivity and protecting natural resources.

AI in Environmental Protection and Climate Monitoring

By analysing enormous volumes of environmental data, artificial intelligence (AI) improves climate monitoring by identifying climatic trends, forecasting extreme weather, and tracking biodiversity. Among the important uses are: Better disaster preparedness is made possible by IBM's AI-based climate models, which use sensor and satellite data to forecast storms, floods, and wildfires. AI-powered deforestation monitoring programs, like Global Forest Watch, employ machine learning to evaluate satellite photos and instantly identify illicit logging operations. AI in marine conservation, where it uses image recognition to monitor endangered species and measure ocean pollution levels. AI is essential to reducing climate change and protecting ecosystems because it enhances climate forecasts and makes proactive environmental preservation possible.

The Role of Intellectual Property in Green AI Innovation

Laws pertaining to intellectual property (IP) are essential in determining how AI-driven green solutions are developed and made available. By giving inventors, the sole right to their

creations, these legal safeguards encourage research and innovation.[4] IP rights can, however, also erect obstacles that restrict access to vital environmental technologies, even while they promote investment in sustainable AI solutions. The many types of IP rights, their effects on innovation, and the difficulties they present for international sustainability initiatives are all covered in this section.

Forms of Intellectual Property Protection in AI-Driven Green Technologies

Several IP regimes provide protection for AI-driven sustainability solutions, including: Patents Provides exclusive rights to the inventors of new innovations for a predetermined amount of time, usually 20 years. To guarantee that businesses get the most out of their research expenditures, many AI-based green innovations, including energy-efficient algorithms or precision agriculture tools, are patented. Copyrights Safeguards creative works of authorship, such as software programs, datasets produced by artificial intelligence, and research articles pertaining to green innovation. AI-powered climate models and sustainability software are legally acknowledged as proprietary goods thanks to copyrights. Trade secrets Preserve private company data, such as AI algorithms utilised in waste management or renewable energy optimisation. In order to preserve competitive advantages without disclosing them to the public, businesses may decide to use trade secrets rather than patents. Every single one of these safeguards advances technology but they also pose accessibility challenges, particularly when addressing urgent environmental issues.

How Patents Encourage Innovation and Investment

The most important type of intellectual property protection in AI-driven green innovation is patents. They fulfil a number of important functions including Promoting R&D Investments that is Patents provide financial incentives for businesses making investments in AI-based sustainability solutions, which encourages more research and development.

Attracting Funding and Partnerships By offering a legal assurance that rivals cannot freely utilise the patented technology, exclusive rights assist businesses in luring investors and partners. Encouraging Commercialisation: Businesses and startups can license copyrighted AI inventions, making money that can be used to fund future developments.

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[4] Liu, T., & Yu, Z. (2022). RETRACTED ARTICLE: The relationship between open technological innovation, intellectual property rights capabilities, network strategy, and AI technology under the Internet of Things. *Operations Management Research*, *15*(3), 793-808.

By guaranteeing that businesses stay dedicated to creating environmentally friendly technologies, a robust patent system may support AI-based sustainability initiatives. But when it comes to the world's environmental problems, this paradigm has serious shortcomings.

The Downside of Patent Restrictions on Green AI Technologies

Although patents encourage innovation, they can also prevent AI-driven green technology from being widely adopted, especially in developing nations and small businesses who cannot pay high licensing costs. Among the main difficulties are: Limited Access to Vital Technologies: Researchers and policymakers that require AI-powered sustainability tools for climate action are unable to access them because many of these technologies are still under corporate hands. High licensing costs: Small firms and developing countries frequently cannot afford copyrighted AI solutions, which further widens the technological divide between affluent and low-income areas. Slower Innovation Diffusion: Tight intellectual property rights might impede the adoption of innovative technology, delaying the delivery of critical solutions to climate change-affected communities. Environmental and Ethical Issues: Restrictive IP rules may put corporate profit ahead of environmental welfare in situations when sustainability is a top concern on a global scale.

Challenges in Balancing IP Rights and Sustainable Development

Global sustainability initiatives may be hampered by overly strict enforcement of intellectual property (IP) regulations, which are intended to reward inventors and safeguard innovation. Restrictive intellectual property rights may make it more difficult for AI-driven green solutions to be adopted and used, even if they have the potential to mitigate climate change and advance sustainable development. This section addresses the ethical issues of knowledge monopolies in sustainability research as well as the difficulties presented by stringent IP rules, especially for researchers, small enterprises, and poor countries[5].

How Strict IP Laws Can Hinder Sustainability Efforts

Climate prediction models, precision agriculture tools, and algorithms for optimising renewable energy are just a few examples of AI-powered sustainability solutions that are frequently covered by patents and copyrights. Although these safeguards promote investment

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[5] Phillips, F. K. (2016). Intellectual property rights in traditional knowledge: enabler of sustainable development. *Utrecht J. Int'l & Eur. L.*, *32*, 1.

from the private sector, they can also Slow Down Technology Transfer: Unrestricted access to AI-driven green technology is hindered by patent protections, which delays their deployment in regions where they are desperately needed. Create Cost and license Barriers: Governments and non-profit organisations find it challenging to execute extensive sustainability initiatives due to the hefty license fees required of businesses and researchers wishing to utilise patented AI discoveries. Restrict Open Research and Collaboration: Tight intellectual property regulations might hinder scientific cooperation by preventing researchers from exchanging data or developing new AI technology. AI-powered climate modelling software could be invaluable for policymakers and environmental scientists worldwide, but if its use is limited by restrictive IP protections, critical climate adaptation efforts may be delayed[6].

Barriers for Small Businesses, Researchers, and Developing Nations

Since they frequently lack the financial and legal skills to handle the complexity of patent licensing, small enterprises, academic researchers, and developing countries are most affected by rigid IP rules. companies and Small Businesses: Many companies developing AI-powered sustainability solutions find it difficult to compete with big businesses that have substantial patent portfolios. Small businesses may be subject to legal threats or be forced out of the market entirely if they are unable to obtain important patented technologies. Academic and Independent Researchers: Due to IP restrictions, scientists and academic institutions working on sustainability projects were unable to get access to patented AI datasets, software, or climate modelling tools, which would hinder their capacity to come up with creative solutions. Developing Countries: Developing nations that are most affected by climate change, including those in Africa, South Asia, and Latin America, frequently do not have access to patentable artificial intelligence (AI)-driven sustainable energy and water management solutions. These countries continue to rely on antiquated and environmentally damaging methods in the absence of inexpensive alternatives

Ethical Concerns Regarding Knowledge Monopolies in Sustainability Research

The establishment of knowledge monopolies, in which powerful firms and affluent countries possess exclusive rights to AI-driven sustainability discoveries, is a significant ethical concern.

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[6] Henry, C., & Stiglitz, J. E. (2010). Intellectual property, dissemination of innovation and sustainable development. *Global Policy*, *1*(3), 237-251.

This poses important queries: Do sustainability technologies powered by AI qualify as public goods? Some contend that private ownership shouldn't limit these advances because they have positive effects on the environment worldwide. Green technology patents help whom? While many wealthy countries and big tech businesses benefit from sustainability research, those who need it most cannot access it. How does corporate social responsibility (CSR) function? Should businesses that possess important sustainability patents be compelled to distribute their inventions through equitable licensing arrangements? Tight IP regulations might hinder sustainability initiatives by limiting access to vital AI-driven technology, even while they are good for encouraging investment. Fairness and ethics are seriously called into question by the obstacles they erect for researchers, small enterprises, and poor countries. In order to realise AI's full potential in global sustainability initiatives, a more balanced strategy that places equal emphasis on innovation and access will be required going forward. Other models that can assist close this gap will be examined in the following section.[7]

Alternative Approaches to IP Protection in AI Sustainability

Strict restrictions can make it difficult for small enterprises, researchers, and developing countries to acquire AI-driven green technology, even if intellectual property (IP) regulations are crucial for promoting innovation. Alternative IP regimes are required to achieve a balance between encouraging innovation and advancing sustainability. In order to guarantee the protection and accessibility of AI-driven sustainability technologies, this section examines open innovation models, patent pools, compulsory licensing, and public-private partnerships as workable options.

Open Innovation Models: Knowledge-Sharing and Collaborative Approaches

Companies, researchers, and institutions work together under the open innovation paradigm to freely share technology, research, and knowledge rather than keeping it exclusive. When it comes to sustainability powered by AI, open innovation can: Develop and implement climate-friendly AI technology more quickly. Encourage relationships across industries so that many stakeholders can advance current technologies. Minimise research duplication to make sustainability initiatives more economical and successful. The Linux Foundation's LF Energy,

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[7] Bauer, H. H. (2004). Science in the 21st century: knowledge monopolies and research cartels. *Journal of Scientific Exploration*, *18*(4), 643-660.

which supports open-source AI-driven solutions for optimising renewable energy, is one example. Businesses and governments may work together to increase energy efficiency and sustainability by exchanging AI algorithms for grid management. Researchers can also offer AI-based sustainability models under flexible copyright terms using Creative Commons license, which permits non-commercial use and future development while also acknowledging the original creators[8]

Patent Pools: Companies Collectively Sharing Patents

A cooperative agreement in which several businesses share their patents for reciprocal advantages is known as a patent pool. Patent pools provide access to vital green innovations in AI-driven sustainability without the constrictive restrictions of private ownership. Among the main benefits of patent pools are lowering licensing fees and lowering the cost of sustainability technology powered by AI. promoting industry cooperation as opposed to rivalry for exclusive intellectual property rights. accelerating the dissemination of technology to make sure that important advancements reach small enterprises and developing countries. The Eco-Patent Commons, where businesses like IBM and Sony voluntarily donated green technology patents for public use, is a real-world example. Shared access to AI-powered precision agriculture technology, renewable energy optimisations, and climate modelling tools may be made possible by a comparable AI-based green patent pool[9].

Compulsory Licensing: Allowing Access to Patents in the Public Interest

Governments can give licenses for patented inventions without the owner's approval through a legal mechanism known as compulsory licensing, which is typically used in situations where the technology is of public interest[10]. Compulsory licensing, which is frequently used in the pharmaceutical and healthcare industries, could be expanded to AI-driven sustainability technology when environmental protection demands it. Governments could impose mandatory licensing in order to: Make sure all countries have access to AI-based climate monitoring technologies. Make AI-powered renewable energy technology more affordable for underdeveloped nations. Avoid monopolies on important environmental remedies. For

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[8] Bogers, M. (2011). The open innovation paradox: knowledge sharing and protection in R&D collaborations. *European journal of innovation Management*, *14*(1), 93-117.

[9] Gallini, N. (2011). Competition policy, patent pools and copyright collectives. *Rev. Econ. Rsch. on Copyright Issues*, *8*, 3.

[10] Yosick, J. A. (2001). Compulsory patent licensing for efficient use of inventions. *U. Ill. L. Rev.*, 1275.

example, if a single company has a patent on an AI algorithm that maximises carbon capture technology, the government may provide a mandatory license to permit wider use for mitigating climate change. But mandatory licensing needs to be handled carefully to strike a balance between incentives for innovation and accessibility

Public-Private Partnerships: Encouraging AI Sustainability Through Government-Backed Initiatives

Governments, commercial enterprises, and academic institutions work together to finance and create AI-driven sustainability solutions through public-private partnerships, or PPPs. These collaborations can: To incentivise businesses to share AI sustainability patents, the government should offer incentives and subsidies. Create research partnerships where public and private funds are used to develop AI-driven climate technologies. Make sure AI-driven sustainability breakthroughs are widely available and reasonably priced. The Mission Innovation Initiative, which combines funding from public and commercial entities to support AI-driven sustainable energy research, is a successful example. In a similar vein, government-sponsored AI sustainability grants might persuade businesses to make some technology open-source in return for tax breaks and research funds.[11]

Legal and Policy Recommendations for a Balanced Approach

Legal and policy changes must strike a compromise between IP protection and equitable access in order to guarantee that AI-driven green technologies effectively contribute to global sustainability. A number of case studies show how IP frameworks can be set up to promote accessibility and innovation. This section examines effective models, legislative changes, and policy approaches that support ethical AI progress and guarantee worldwide advantages.

Case Studies: Successful Balancing of IP and Sustainability

Tesla's Open Patent Strategy

In 2014, Tesla made its electric vehicle patents open-source, allowing competitors to use its technology to advance the adoption of sustainable transportation. This decision accelerated EV industry growth while still allowing Tesla to maintain a competitive edge through branding and

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[11] Izuchukwu Precious, O., Zino Izu, O., Frank Chudi, A., & Theresa Ojevwe, A. (2025). Public-Private Collaborations in Waste Management Evaluating Policy Effectiveness and Governance Models in Nigeria. *Journal of Integrity Ecosystems and Environment*, *3*(2), 25-53.

continuous innovation[12].

The Medicines Patent Pool (MPP) Model

While not AI-focused, the MPP model used in global health can be adapted for AI-driven sustainability. The MPP allows generic drug manufacturers to produce patented medicines at lower costs, ensuring affordable access. A similar AI-driven green technology patent pool could facilitate access to climate adaptation solutions, especially for developing nations[13].

UNESCO's Open Science Framework

The UNESCO Recommendation on Open Science (2021) promotes open access to research, AI datasets, and technological tools. This model encourages knowledge-sharing while ensuring proper attribution and incentives for researchers.[14]

Conclusion

By improving waste management, sustainable agriculture, renewable energy, and climate monitoring, artificial intelligence is transforming green innovation. These developments are essential for combating climate change, but stringent intellectual property rights may limit access to essential sustainability technology, especially for small businesses and underdeveloped countries. To guarantee that AI-driven green solutions serve society as a whole, accessibility must be balanced with IP regulations, which encourage investment and innovation. Alternative strategies can aid in bridging the gap between accessibility and protection, including public-private collaborations, compulsory licensing, patent pools, and open innovation models. Policymakers must change IP rules to promote cooperation and knowledge exchange without stifling innovation if they hope to see long-term development. AI will continue to propel environmental sustainability with the help of a well-balanced legal framework, which will help both inventors and the international community combat climate change.

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[12] Wang, J., & Peng, X. (2020). A study of patent open source strategies based on open innovation: the case of Tesla. *Open Journal of Social Sciences*, *8*(07), 386.

[13] Wang, L. X. (2023). A cost-benefit analysis of the medicines patent pool. *Forthcoming in: Economics Bulletin, Max Planck Institute for Innovation & Competition Research Paper*, (23-18).

[14] Peršić, A., & Straza, T. (2023). Open science for all: Implementing the UNESCO Recommendation on Open Science for an equitable and just transition to open science. *College & Research Libraries News*, *84*(10), 377.

References

1. Mehrotra, A. (2024). Navigating the Intellectual Property Landscape in the Age of Artificial Intelligence: Towards a Global Legal Paradigm. *International Journal of Innovations in Science, Engineering and Management*, 253-258

2. Poddar, A., & Rao, S. R. (2024). Evolving intellectual property landscape for AI-driven innovations in the biomedical sector: opportunities in stable IP regime for shared success. *Frontiers in Artificial Intelligence*, *7*, 1372161.

3. Varshney, Y., Dubey, D., Kumar, V., Sharma, S., & Singh, S. Enhancing Sustainable Practices through AI-Driven Green Technology.

4. Liu, T., & Yu, Z. (2022). RETRACTED ARTICLE: The relationship between open technological innovation, intellectual property rights capabilities, network strategy, and AI technology under the Internet of Things. *Operations Management Research*, *15*(3), 793-808.

5. Phillips, F. K. (2016). Intellectual property rights in traditional knowledge: enabler of sustainable development. *Utrecht J. Int'l & Eur. L.*, *32*, 1.

6. Henry, C., & Stiglitz, J. E. (2010). Intellectual property, dissemination of innovation and sustainable development. *Global Policy*, *1*(3), 237-251.

7. Amentie, C., Negash, E., & Kumera, L. (2016). Barriers to growth of medium and small enterprises in developing country: Case study Ethiopia. *Journal of Entrepreneurship and Organization Management*, *5*(3), 1-4.

8. Bauer, H. H. (2004). Science in the 21st century: knowledge monopolies and research cartels. *Journal of Scientific Exploration*, *18*(4), 643-660.

9. Bogers, M. (2011). The open innovation paradox: knowledge sharing and protection in R&D collaborations. *European journal of innovation Management*, *14*(1), 93-117.

10. Gallini, N. (2011). Competition policy, patent pools and copyright collectives. *Rev. Econ. Rsch. on Copyright Issues*, *8*, 3.

11. Yosick, J. A. (2001). Compulsory patent licensing for efficient use of inventions. *U. Ill. L. Rev.*, 1275.

12. Bogers, M. (2011). The open innovation paradox: knowledge sharing and protection in R&D collaborations. *European journal of innovation Management*, *14*(1), 93-117.

13. Gallini, N. (2011). Competition policy, patent pools and copyright collectives. *Rev. Econ. Rsch. on Copyright Issues*, *8*, 3.

14. Yosick, J. A. (2001). Compulsory patent licensing for efficient use of inventions. *U. Ill. L. Rev.*, 1275.

15. Wang, J., & Peng, X. (2020). A study of patent open-source strategies based on open innovation: the case of Tesla. *Open Journal of Social Sciences*, *8*(07), 386.

16. Wang, L. X. (2023). A cost-benefit analysis of the medicines patent pool. *Forthcoming in: Economics Bulletin, Max Planck Institute for Innovation & Competition Research Paper*, (23-18).

17. Peršić, A., & Straza, T. (2023). Open science for all: Implementing the UNESCO Recommendation on Open Science for an equitable and just transition to open science. *College & Research Libraries News*, *84*(10), 377.