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GREEN IP- A MUCH NEEDED INTERPLAY BETWEEN THE INTELLECTUAL PROPERTY AND STABILITY

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Abstract
The concept of "Green IP" represents a vital interplay between Intellectual Property (IP) and environmental stability. This paper explores the crucial intersection of IP rights and sustainability goals, emphasizing the need for a harmonious coexistence between technological innovation, creative expression, and ecological preservation. By examining the role of patents, trademarks, copyrights, and other IP mechanisms in promoting environmentally friendly practices, this study sheds light on the potential for IP systems to drive sustainable development. The abstract underscores the significance of incorporating ecological considerations into IP frameworks, highlighting the imperative for collaboration between innovators, policymakers, and environmental advocates.
Keywords: Green IP, Intellectual Property, environmental sustainability, patents, trademarks, copyrights, sustainable development.

1.1 INTRODUCTION

Throughout history, innovation has remained intrinsic to the essence of humanity. As societies expand and the demand for convenience continues to escalate, individuals have harnessed their intellectual prowess to engineer novel technologies. The boundless potential of human ingenuity remains beyond estimation. Human cognition permeates every facet of society, compelling the imperative to nurture innovation for the holistic advancement and betterment of the collective.

Amid the epoch of globalization, wherein the globe is intricately interlinked, participating in trade, commerce, cultural interchange, and dialogues, it is imperative to underscore that human innovation serves as the catalyst for the advancement of the world as a unified entity. Cultivating and incentivizing the swift proliferation of innovative concepts assumes paramount significance, serving as a conduit for establishing an ambiance of progress on a global scale.In recent decades, the global community has adopted a perspective on environmental and developmental matters that prioritizes intergenerational parity and sustainable progress. This perspective, marked by substantial progress, has proven adept at confronting numerous environmental trials.

Nevertheless, there exist additional nascent concerns demanding a well-defined framework to establish an enduring legacy for future generations. Primarily, addressing the swift shifts in our climate and the degradation of our environment necessitates fundamental overhauls of our energy infrastructure. According to projections from the International Energy Agency (IEA), the anticipated requirement for energy sector investments might surge to a staggering USD 46 trillion by 2050.[1]

It is projected that over 75% of the fresh investments in the energy sector will be directed towards emerging economies. Evidently, such a substantial capital influx cannot rely solely on governmental initiatives. The attainment of future objectives necessitates the introduction of novel business paradigms, policy instruments, and promotional approaches.

In contemporary times, the pressing concerns of environmental sustainability and the consequences of climate change have garnered significant attention on the global stage. Nations spanning from the United States and the United Kingdom to France, Japan, Russia, and India have proactively unveiled strategies to champion the cause of environmental preservation. The international community has remained deeply engrossed in numerous discussions centered around safeguarding the environment and fostering sustainable progress. A concerted drive has been undertaken to establish a nexus between ingenuity, technological advancement, and ecological progress. This stems from the recognition that novel technologies, often harnessed for industrial applications, have significantly contributed to the deterioration of the environment. Therefore, unwavering endeavors persist to counterbalance the adverse impacts of technology on the planet's climate.

A range of global frameworks has been devised to address environmental conservation, such as the Nagoya Protocol, Stockholm Convention, Kyoto Protocol, Earth Summit, and the more recent Paris Agreement. Nevertheless, a broader perspective is warranted, particularly concerning the interplay of technology, innovation, and their implications for the worldwide climate. This brings to the forefront the realm of patent governance, as patent laws play a pivotal role in overseeing the proliferation and transference of technology. The vitality of patents is unmistakable; they bestow a safeguarded monopoly, essential for sustaining the viability of a technology in the market. However, this relationship operates as a reciprocal arrangement. Extending patent protection to inventors inherently nurtures a conducive environment for further innovation. This symbiotic process ultimately redounds to the greater benefit of society, as inventors, when assured of

[1] See https://www.irena.org/-media/Files/IRENA/Agency/Publication/2018/Apr/IRENA_Report_GET_2018.pdf (last accessed on 12 April 2023)

their intellectual property's security, are encouraged to share their breakthroughs with the wider community.

Over time, a prevailing notion within the global community has emerged: the promotion of technology and innovation that contributes positively to the amelioration of climatic conditions. This conceptual underpinning has been termed “green innovation”, and the instrumental technology geared toward realizing this objective has been aptly labeled“green technology.”

Indeed, the ongoing global practice revolves around the continual innovation, advancement, and widespread adoption of eco-friendly technologies. These cutting-edge technologies traverse international boundaries, infiltrating diverse markets spanning developed, developing, and underdeveloped nations. The collaborative cultivation and commercialization of pioneering products and services, the exchange of expertise, equipment maintenance, and the granting of patent licenses stand as pivotal processes that significantly contribute to the establishment of indigenous technological capabilities.

The primary objective of this Research Paper entails an exhaustive exploration of various facets within the realm of patents and their operational scopes. The researcher endeavors to establish a coherent relationship between patents and the facilitation of eco-friendly technology proliferation on a global scale. A thorough analysis is slated for multiple elements, including the green economy, eco-conscious consumer behavior, environmentally focused marketing strategies, sustainable entrepreneurial endeavors, patent pooling mechanisms, and the implications of compulsory licensing. These dimensions will be meticulously dissected and scrutinized within the confines of this dissertation.[2]

1.2 PROMOTING ECO-FRIENDLY INNOVATION: THE ROLE OF THE PATENT SYSTEM

The prevailing global apprehension regarding climate change necessitates swift advancements in eco-friendly technological innovations and their dissemination. Addressing the detrimental ecological consequences requires the incorporation of environmentally sustainable technologies (ESTs).

In 2007, the Bali Conference was held under the United Nations Framework Convention on Climate Change (UNFCCC). This event further highlighted the significant role played by the patent system in facilitating technology transfer, particularly in the context of addressing climate change challenges.

In essence, the fundamental role of any given patent system revolves around the facilitation and amplification of eco-conscious innovation and the worldwide spread of cutting-edge technology. The patent framework within any economy is predicated on the imperative equilibrium between the common welfare and the inducements for private enterprises.

The propagation of novel and ingenious knowledge on a broad scale inherently contributes to the greater good of the public.

Incentives are extended to a wide range of inventors and innovators by granting them an economically beneficial privilege for their patented inventions. However, it has come to attention that the intended dissemination of the underlying technology is either not easily accessible or falls short of the desired technical standards. The complexity of numerous patent rights held by multiple patent-holders makes the practical use of these patented inventions significantly challenging.

The concept known as the "tragedy of the anti-commons," initially presented by Eisenberg and Heller in 1998, comes into play when multiple patent owners with conflicting rights hold authority over their respective past inventions. This creates barriers that impede future research and innovation. The result is a disruption in the flow of knowledge and a hindrance to subsequent innovative efforts, highlighting the adverse impact of certain patent frameworks on innovation that is environmentally conscious. This situation necessitates a thorough re-evaluation of patent policies to cultivate a supportive environment for innovation that is geared towards sustainability.

The United Nations Secretariat and several developing nations assert that intellectual property rights pose a significant obstacle to the advancement and distribution of environmentally friendly technology. Additionally, it is argued that these ecologically beneficial technologies remain inaccessible to developing countries due to stringent patent regulations that hinder knowledge sharing or utilization. Patent rights are said to foster monopolistic conditions by bestowing sole exploitation privileges upon the originator, thereby leading to exorbitant pricing of innovations and constraining the spread of accessible climate change mitigation technology innovations.[3]

In March 2011, several developed economies introduced an accelerated examination process. This initiative aims to facilitate speedy examination of environmentally-friendly patent applications, enabling them to secure early patent protection compared to other patent categories.

Another policy mechanism in a similar vein is the global patent prosecution highway (PPH), designed to expedite patent processing and standard assessment. As of 2014, 19 national intellectual property (IP) offices globally have successfully incorporated the PPH. The key advantage of the PPH lies in its ability to facilitate a swift assessment of patent applications, especially when the claims tied to the application have garnered endorsement from any of the involved IP offices.

Moreover, multiple global organizations have embarked on innovative policy initiatives with the goal of enhancing the accessibility and adoption of technologies designed to address climate change. A significant instance is the inception of the CTCN (Climate Technology Centre and Network) in 2010, an initiative spearheaded by the United Nations Framework Convention on Climate Change. The purpose behind this establishment is to actively propel endeavors in the arena of technology advancement and transfer.

More recently, in November 2013, WIPO introduced a remarkable venture known as WIPO GREEN. This initiative is strategically focused on fostering a platform that stimulates and expedites the assimilation, embrace, and distribution of ecologically sound technologies and associated solutions.

WIPO GREEN comprises primarily of these two fundamental elements:

[2] Brant, Jennifer, Green Technology Diffusion: Insights from Industry, February 2014; Available at http://www.wipo.int/wipo_magazine/en/2014/01/article_0002.html (Accessed on 12 April, 2023)

[3] Even though, neither the original UNFCCC treaty nor the Kyoto protocol expressly mentions intellectual property in any of their provisions. However, the treaty text invites the parties to take all practicable steps to promote, facilitate and finance, the transfer of, or access to environmentally sound technologies and know-how to other parties, particularly developing country parties.

(1) An openly accessible repository containing diverse innovations, knowledge, and other intellectual property assets;
(2) A worldwide platform that establishes connections between those offering technology and those in pursuit of technological solutions.

Additionally, WIPO GREEN provides a comprehensive array of effective services aimed at facilitating successful commercial transactions among all stakeholders.[4]

1.3 GREEN TECHNOLOGY: TRENDS & PROSPECTS

The influence of contemporary human lifestyles on the climate has demonstrated noteworthy effects over recent decades. Numerous elements play a role in generating this influence, encompassing pollution, carbon emissions, the depletion of natural resources, deforestation, and more. The cumulative outcome of these determinants culminates in the degradation of the environment and the escalation of global warming.[5]

The comprehension of this impact has been steadily expanding, accompanied by an ongoing increase in awareness. Recent scientific revelations have brought to light the magnitude of the threat posed by climate change to our very existence. Given this development, the international community is actively seeking remedies to alleviate the effects of such climate shifts. This underscores the necessity for progressive policy adjustments.

Concurrently, there is a parallel call for transformations in lifestyle, education, investments in research and development, and social behaviors. Enacting these affirmative measures will greatly contribute to the promotion of sustainability and the principles of fairness across generations.

The role of technology in addressing the global challenge of climate change and sustainable development holds immense significance. Over time, the global community has extensively deliberated upon matters concerning technology transfer and collaboration. As previously noted, the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol stand as pivotal documents in these discussions.

Numerous formidable obstacles obstruct the path toward the advancement and proliferation of eco-friendly technology. Several elements propel this trajectory, and the inherent uncertainty enveloping these elements further compounds the challenge. Factors such as tangible expenses, final product viability, market reception, the feasibility of reaping research gains in an intensely competitive environment, current and future policies, pricing dynamics of competitive and complementary goods, and the regulatory influences on both the research trajectory and ultimate outcome are all besieged by the specter of uncertainty. Within this panorama of uncertainties, the burden of substantiating expenditures on environmentally conscious technologies becomes arduous for innovative enterprises. Consequently, governmental intervention becomes imperative to acknowledge and address these uncertainties, fostering the establishment of a steady regulatory milieu that nurtures innovation and facilitates the diffusion of green technology.

Comparable to other technological domains, the evolution of green technology necessitates both capital investment and incentivizing mechanisms. In this context, the synergy between public consciousness and governmental impetus emerges as pivotal. Importantly, the framework governing intellectual property assumes a role of paramount significance, bestowing value and import upon novel breakthroughs. This framework, in turn, serves as a substantial catalyst propelling future advancements and the extensive proliferation of sustainable technologies.[6]

The existing body of literature concerning the funding of environmentally sustainable innovation appears to be constrained. Several scholars have proposed alternative financial frameworks designed to attract both public and private funding for technologies that contribute to climate mitigation. These frameworks, however, are intricately linked to variables such as the specific technological domain, the level of market maturation, the developmental stage of the technology itself, and the inherent risks tied to research and innovation endeavors. Ultimately, prevailing market dynamics exert considerable influence over the hindrances encountered in securing funding and the subsequent investment decisions made within a defined temporal context.

1.4 ACCESSING GREEN TECHNOLOGY AND EMBRACING ECO-FRIENDLY INNOVATION: OBSTACLES AND HURDLES

Implementing policies that facilitate the advancement and dissemination of eco-friendly technology encounters various barriers within the market landscape. These barriers necessitate careful consideration:

(i) The absence of incentives from market dynamics hinders firms and entrepreneurs from allocating resources towards green innovation.
(ii) Government intervention can inadvertently discourage technology adoption by fostering a culture of free riding, particularly prominent in developing economies.
(iii) Although public backing for Research and Development (R&D) leads to knowledge spill-overs, it can discourage private entities from investing optimally in green innovation.
(iv) Concerns about the effectiveness of market mechanisms in addressing environmental externalities can also dampen motivation for eco-friendly initiatives.
(v) The adoption and diffusion of developed green technologies is significantly impeded if market signals indicate their weakness.

These challenges highlight the need for astute policy-making and strategic interventions to surmount the hindrances

[4] WIPO GREEN Members include partners and users from public or private institutions, and the WIPO
Secretariat. See World Intellectual Property Organization, WIPO GREEN Charter, online: WIPO <https://www3.wipo.int/wipogreen/en/about/pdf/charter_en.pdf> (accessed on 12 April, 2023)

[5] See Kyoto Protocol to the United Nations Framework Convention on Climate Change, Annex A, Dec. 11, 1997, U.N. Doc FCCC/CP/1997/7/Add.1, 37 I.L.M. 22, available at http://unfccc.int/resource/docs/convkp/kpeng.pdf [hereinafter Kyoto Protocol] (listing the six major greenhouse gases: Carbon dioxide (CO2), Methane (CH4), Nitrous oxide (N2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulphur Hexafluoride (SF6)).

[6] See William Dibble, Justifying Intellectual Property, 1 UCL JURIS. REV. 74, 74 (1994) ("The need for intellectual goods in contemporary culture means that we place an enormous value on them. The value however can only be realised in the form of a price if it is protected by some form of law or recognised within law.").

impeding the progress of green technology innovation and implementation.[7]

In addition to the aforementioned, there exist additional obstacles to the widespread adoption and spread of eco-friendly technology, stemming from deficiencies in proficiency, networking, structures, establishments, and models. These hindrances manifest due to a lack of harmony between two components of the innovation ecosystem – private enterprises and the public research domain. Furthermore, other forms of policy shortcomings influencing the dissemination of green technology can be pinpointed and recognized. These encompass the effective expression of market requirements, synchronized policy efforts, strategic orientation, and inadequacies in ensuring adaptability.[8]

1.5 FORMULATION OF TECHNOLOGY-SPECIFIC POLICIES

One significant obstacle in devising strategies for both the demand and supply sides of green innovation pertains to the absence of precise indicators to fully grasp the foundation necessary for charting a roadmap toward future objectives. Gaining a comprehensive comprehension of the elements comprising green innovation and green technology is essential prior to formulating strategies for investment and research and development (R&D). At present, the distribution of R&D funds within the context of environmentally sustainable supply-side initiatives is predominantly limited to renewable energy technologies or technologies that are ecologically beneficial. However, extensive research has unequivocally demonstrated that diverse domains, including social sciences, contribute to this progression. Hence, the establishment of a comprehensive delineation for terms like "green innovation," "green growth," and "green technology" is of utmost significance.

Another formidable challenge encountered by governments in the pursuit of green development is the attainment of technological neutrality. In essence, ensuring a greener system becomes a complex undertaking, especially as technologies converge and evolve through distinct stages. Additionally, the absence of concrete evidence linking governmental research and development (R&D) efforts and public policy to the progression of environmentally friendly innovation presents a noteworthy obstacle.[9]

To establish a novel technological paradigm, it becomes imperative to formulate policies that cater specifically to the technology domain, running in parallel with technology-neutral policies. As the development trajectory matures and the demand for particular technologies escalates, governmental policies necessitate timely adaptations. The allocation of resources among various technologies in the market should not be compelled to adhere to an equal distribution. Instead, the choice of allocation should be contingent upon market demand, as well as the efficacy and pertinence of each technology.

An inherent facet within technology-centric policies revolves around the factor of timing. While predetermining investments in research and development based on industrial structures and research capabilities is one facet, skilfully channelling technology-targeted investments in tandem with commercial advancements across the expansive realm of technology poses a distinct challenge.

To ensure the effective creation and implementation of technology-focused policies, it is recommended to undertake the following measures:

i. Encouraging the adoption of "strategic policy intelligence" techniques.
ii. Employing technology road-mapping strategies.
iii. Coordinating research agendas to optimize funding allocation.
iv. Vigilantly tracking the evolving technological landscape within the market.
v. Conducting thorough assessments of societal shifts impacting consumers and developers alike.

Ensuring the endorsement of priority-setting procedures should be accomplished via extensive agreement among policymakers. Consequently, an effectively organized, enduring budget serves as an excellent method to foster a perspective of enduring innovation sustainability.

1.6 ROLE OF PATENTING IN PROMOTING GREEN INNOVATION

Numerous ecologically-aware technologies have surfaced in the last ten years and have been formally documented by global patent offices. Several state-of-the-art breakthroughs, supported by proficient research and development endeavors, have been officially granted patents by the United States Patent and Trademark Office (USPTO).

Within the United States, patents play a central role as exclusive intellectual property rights for inventions, driving innovative pursuits and propelling economic advancement. As technological progress and industrial transformations continue to unfold, the importance of the patent system has grown exponentially. This system stands as a crucial pillar, safeguarding the interests of innovators within the rapidly expanding commercial domain.

Patents, acting as a vital protective barrier for novel technologies spanning biotechnology, software, and beyond, have recently shone a spotlight on environmentally-friendly innovations, capturing the attention of policymakers. Consequently, shifts in legal and regulatory frameworks have resulted in the broadening of patentable subject areas, further amplifying the efficacy and significance of patents. The United States patent system's role is pivotal in nurturing eco-friendly innovation across the nation's technological landscape, and its influence extends to emerging regions worldwide.

The Clean Energy Patent Growth Index (CEPGI) has been diligently tracking environmentally friendly patents since 2002. The results have revealed a steady upward trend in green patents across exceptionally productive economies, such as Japan, Germany, Korea, Taiwan, and the United States. These observed eco-friendly patents encompass a broad range of ecological sectors, including solar energy, wind energy, biofuels, geothermal energy, hybrid electric vehicles, and beyond. The data from CEPGI accentuates a continuous increase in both the filing and authorization of green patents, emphasizing the steadfast dedication to ecological innovation.[10]

[7] Jaffe A.B., R.G. Newell and R.N. Stavins (2004), Technology Policy for Energy and the Environment, in A.B.Jaffe, J. Lerner and S. Stern (eds.), Innovation Policy and the Economy, Vol. 4, The MIT Press.

[8] Weber, M.K. and H. Rohracher (2012), Legitimizing Research, Technology and Innovation Policies for Transformative Change: Combining Insights from Innovation Systems and Multi-Level Perspective in a Comprehensive 'Failures' Framework, Research Policy, Vol. 41, pp. 1037-1047.

[9] Grubb, M. (2005) Technology Innovation and Climate Change Policy: An Overview of Issues and Options,
Keio Economic Studies Vol. 41(2), pp. 103-132.

[10] Using Green Patents to Create a More Sustainable Business; available at https://www.ecovadis.com/blog/using-green-patents-create-sustainable-business/ (last accessed on 14 April, 2023)

1.7 EVOLUTION OF GREEN INNOVATION IN INDIA

With a population of 1.3 billion, India stands as the largest democracy globally and undeniably ranks among the swiftest expanding economies. Nevertheless, amid this growth, there exist certain drawbacks, notably concerning the disconcerting degradation of the environment. This underscores the urgent need to shift our focus toward fostering sustainability and promoting energy efficiency within India.

In-depth analysis conducted through separate surveys conducted by the World Bank has brought forth compelling concerns:

a) The detrimental impact on the environment in India incurs an estimated cost of 80 billion USD annually, which corresponds to approximately 5.7 percent of the nation's economy.
b) On a global scale, India's air pollution exposure ranks it at a concerning 155th position out of 178 countries.

Furthermore, the assessment conducted by the World Bank reveals a sobering revelation - India's environmental quality trails behind that of all BRICS nations. The gravity of the situation is further emphasized by the recent study published by the World Health Organization, which designates 14 Indian cities amongst the 30 most polluted cities globally.

Acknowledging this ecological dilemma head-on, the Indian government has admirably embraced the environmental challenge and embarked on a resolute journey toward achieving sustainable development. A transformative insight has emerged among Indian policymakers, recognizing the pivotal role of green innovation, encompassing climate-friendly technologies, novel business models, and the like. This realization forms a cornerstone for steering the Indian economy into the realms of eco-friendly progress.

1.8 REASONS BEHIND INDIA'S SLOW GREEN GROWTH

An in-depth examination of India's policy approach to combat environmental degradation and foster green innovation reveals the following limitations:

i. India's vast innovation potential remains largely untapped and underutilized.
ii. The valuable resource represented by the youth has yet to be adequately harnessed for promoting green development.
iii. Existing environmental regulations and guidelines for encouraging green innovation lack robustness and clarity.
iv. The business community in India has often prioritized profit generation over actively addressing and resolving environmental challenges.
v. India's investment landscape has not strongly favored green innovation. For instance, India's annual investment of 3 billion USD in sustainable technologies pales in comparison to the substantial investments in two prominent e-commerce giants, namely Flipkart and Amazon.

Nonetheless, building upon these observations, Indian policymakers have embarked on significant strides toward promoting green innovation and sustainable development. Drawing insights from a comprehensive analysis of the U.S. context, the subsequent section will delve into a thorough examination of the strategies driving green growth in India.

1.9 INNOVATION ECOSYSTEM: INDIAN PERSPECTIVE

The landscape of science, technology, and innovation infrastructure has experienced remarkable growth following the LPG movement in India. Numerous governmental entities at both the Central and State levels are deeply involved in rigorous research and development spanning diverse domains.

Numerous distinguished research institutions operate within the scope of the federal administration. These include the Department of Scientific and Industrial Research (DSIR), the Department of Science and Technology (DST), the Department of Atomic Energy (DAE), the Department of Space (DOS), the Department of Ocean Development (DOD), and the Department of Biotechnology (DBT). Additionally, the Ministry of Earth Sciences and the Ministry of New and Renewable Energy are actively engaged in bolstering environmental conservation and are under the direct purview of the Central Government.

Moreover, a multitude of independent research and development institutes, along with private sector entities, academic establishments, and various departments such as IT, environment, health, and agriculture, engage in focused domain-specific research. Their collective efforts yield valuable outcomes that hold the potential to drive progress in diverse spheres.

Undoubtedly, since gaining independence, the trajectory of India's research and development landscape has undergone a monumental transformation. The innovation ecosystem has evolved into a robust and intricate multi-layered framework. Realizing the full potential of this ecosystem hinges on the precise execution of ambitious governmental policies aimed at fostering the well-being of the nation and its citizens.

1.10 R&D IN INDIA: STATISTICAL ANALYSIS

As per an analysis conducted in 2013 by the Department of Science and Technology, the allocation towards Research and Development (R&D) accounted for approximately 0.88% of the country's Gross Domestic Product (GDP), equivalent to INR 72.62 billion. This financial commitment was a combined effort from both the private and public sectors. Notably, a significant portion of the investment stemmed from the Central Government through its Planning Commission, now recognized as NITI Aayog. Various autonomous research-oriented institutes, specializing in defense, atomic energy, and space exploration, among others, were beneficiaries of these contributions.

Citing data from World Bank Indicators spanning from 2000 to 2011, the R&D investment in India witnessed a modest increment, rising from 0.74% to 0.81%. This growth, however, remains relatively inconsequential when contrasted with the R&D spending of nations like China (0.8% to 1.84%) and Japan (3% to 4.4%) over the same period. Recent times have witnessed proactive endeavors by the Indian government to invigorate R&D across diverse sectors, indicating a determined push towards fostering innovation and technological advancement.

In the year 2008, India held a modest 3.7% share of global scientific publications, securing the 9th position in the global ranking. A noteworthy contrast can be observed when examining China's remarkable achievements in the same realm, boasting an impressive 11% global share in scientific publications and ascending to the second position globally. Additionally, it is significant to note that China has achieved

the distinction of filing the highest number of patent applications with a single IP office. Meanwhile, India also stands as one of the leading nations in patent applications, solidifying its position within the top ten countries.[11]

Analyzing patent grants reveals an interesting trend. India's numbers have shown a moderate rise, increasing from 8 in 1980 to 1137 in 2010. In contrast, China's figures have surged rapidly, escalating from 4 in 1980 to an impressive 3303 in 2010. Notably, China stands out as the IP office receiving the highest volume of patent applications, experiencing remarkable annual growth in received filings. India, while making strides, also secures a position in the top ten countries for patent applications submitted to its own patent office.

This analysis underscores the importance of reevaluating India's approach to green innovation policy. To truly embrace the path of sustainable growth, it becomes imperative to introduce innovative and groundbreaking policy measures that steer us confidently toward a future of eco-friendly progress.

1.11 GREEN INFRASTRUCTURAL GROWTH AND THE WAY AHEAD

The evident acceleration in India's infrastructural expansion carries inherent environmental consequences, a reality that both governmental and private entities conscientiously recognize. Measures are actively being pursued in tandem to address this facet. Preserving the ecosystem rests coequally on the shoulders of policymakers and business custodians.

The United Nations, in alignment with this perspective, underscores that the attainment of sustainable developmental objectives hinges upon a synergistic alliance involving governmental bodies and corporate enterprises. A symbiotic exchange of knowledge and technology stands poised to significantly advance the global mission of mitigating climate change.[12]

Consequently, it becomes the collective responsibility of Indian stakeholders to embark on a more environmentally conscious trajectory, alongside the imperative duty of the government to facilitate the proliferation of green innovation and the adoption of eco-friendly technologies. This conceptual shift signifies a transformative transition, shifting the focus from conventional infrastructure towards an emphasis on ecologically sustainable infrastructure.

In the pursuit of this environmentally conscious path, Cochin Airport has emerged as an exemplar, marking its distinction as India's inaugural airport to harness solar energy with a significant 12MW solar power project. This pioneering initiative has bestowed the airport with the capacity to generate an impressive 18 million units of electricity annually. Achieving this milestone, Cochin Airport accomplished the noteworthy feat of being the first airport in India to be powered entirely by solar energy, a feat it accomplished in August 2015.

The innovative solar power infrastructure at Cochin Airport is a product of Bosch Ltd., located in Bangalore, and functions through the utilization of cutting-edge photovoltaic panels. This progressive airport's solar energy framework is adept at producing a substantial 18 million units of power per annum. Notably, the commendable Cochin Airport solar venture stands as a financially sustainable endeavor, with a project cost of approximately INR 62 Crores. On a daily basis, this remarkable infrastructure can harness and utilize an impressive range of 50,000 to 60,000 units of electricity.

A significant step forward in India's eco-friendly progress can be attributed to the newly constructed Chandigarh International Airport in Mohali. This innovative project is the brainchild of the highly regarded infrastructure firm Larsen and Toubro (L&T). The airport showcases a range of pioneering green technologies, including dual-insulated roofing, fly ash bricks, cavity walls, and a sensor-driven plumbing system aimed at conserving water. Notably, the airport boasts energy-efficient chillers, with the majority of its illumination being provided by LEDs. Atop the terminal, a dedicated 200KW solar plant furthers its sustainable energy initiatives.

These two airports have not only embraced advanced fossil fuel technologies and renewable energy sources but have also aligned their initiatives with the United Nations' sustainable development objectives. Their endeavors have concurrently spurred investments in research and activities centered around eco-friendly technologies, thus propelling the green technology landscape.

1.12 CASE STUDY: THE CLEAN DEVELOPMENT MECHANISM (CDM) AND INTELLECTUAL PROPERTY

The Clean Development Mechanism (CDM) constitutes a framework under the United Nations Framework Convention on Climate Change (UNFCCC), offering developed nations the avenue to invest in projects aimed at curbing emissions within developing countries. Such initiatives are designed to mitigate greenhouse gas emissions while concurrently fostering sustainable development. Within the realm of eco-friendly technology, the CDM serves as a conduit for the transference of environmentally conscious technologies from the developed world to their developing counterparts. Intellectual property emerges as a pivotal player in the intricate dance between CDM ventures and the propagation of green technology.[13]

1. ***Enhancing Technology Sharing:*** Intellectual property rights (IPRs) play a pivotal role in facilitating the transfer of technology by furnishing legal safeguards to creators, encouraging them to share their technological advancements. Within the framework of CDM projects, these rights act as a catalyst for technology holders to disseminate eco-friendly innovations to developing nations. By safeguarding their creative breakthroughs, technology holders gain the assurance to share their know-how, secure in the knowledge that their intellectual property rights will be upheld.
2. ***Obstacles in Technology Dissemination:*** Conversely, intellectual property can introduce complexities in the diffusion of technology within CDM projects. Adhering to existing intellectual property rights can create impediments in accessing and implementing sustainable technologies. The expenses linked with licensing or procuring patented technologies can be formidable for developing nations, curbing their capacity to adopt and actualize sustainable solutions.
3. ***Harmonizing Intellectual Property and Sustainable Progress:*** The provided case study meticulously examines the intricate equilibrium between the

[11] Ramani, S.V. (ed.) (2014). Innovation in India: Combining Economic Growth with Inclusive Development,Cambridge University Press, New Delhi

[12] Environment Friendly Green Technologies Being Used in the Developing Infrastructure of India; available at https://www.masterbuilder.co.in/environment-friendly-green-technologies-used-developing-infrastructure-india/(last accessed on 14 April, 2023)

[13] Green Patents: Intellectual Property Strategies to Protect the Environment" by Bronwyn H. Hall, Christian Helmers, and Mark Rogers.

protection of intellectual property and the imperative for sustainable development. It navigates through policy strategies and mechanisms that harbor potential in striking a harmonious chord—such as technology transfer accords, licensing pacts, and initiatives aimed at augmenting capacity.

4. ***Facilitation of Ecological Innovation:*** The Clean Development Mechanism (CDM) additionally serves as a catalyst for ecological innovation, offering monetary incentives and avenues for technology pioneers. Through harnessing the potential of the CDM, creators can secure funding and assistance for their ventures, thereby fostering the advancement of novel and enhanced ecological technologies. Safeguarding intellectual property guarantees that innovators can harvest the rewards of their creations, consequently fostering a climate conducive to sustained innovation within the realm of green technology.[14]

By conducting an examination of the interaction among CDM, intellectual property, and the transfer of green technology, this specific study provides insights into the complexities and advantages of ensuring a harmonious relationship between intellectual property rights and the advancement of eco-friendly technology. This analysis highlights the significance of devising approaches that effectively harmonize the safeguarding of intellectual property while also facilitating extensive availability of environmentally sustainable technologies. This, in turn, promotes worldwide cooperation and the establishment of a sustainable developmental trajectory.[15]

CONCLUSION

The study focuses on "Green IP," the intersection of intellectual property (IP) and environmental stability. While India's green growth and innovation trends show improvement, challenges lie in policy complexities, public-private disparities, and international environmental responsibilities. The study analyzes patent law's role in green innovation, referring to India's patent regime. Analysis covers green patenting, technology transfer, licensing, and fast-tracking globally, revealing the evolving landscape. The research examines emerging economies (e.g., India) and lesser-developed nations, indicating stronger IP protection may enhance technological transfer. However, the link between patent protection and environmental impact is nuanced, requiring a specialized framework. Flexible policy instruments coupled with market-based approaches foster green technology diffusion. The rising environmentally conscious consumer base may necessitate adapting patent policies. India's progress in green innovation underscores the need for robust patenting policies aligned with global sustainability goals, encouraging businesses to integrate green practices. Determining the level of green consumers aids policymakers in refining patent regimes and environmental regulations.

References

1. *Green Innovation and Intellectual Property: Managing Intellectual Property for Sustainable Development" by Abbe E.L. Brown and Matthew Rimmer*
2. *Intellectual Property and Sustainable Development" by Jeremy de Beer, Chidi Oguamanam, and Tomer Broude.*
3. *Intellectual Property Rights and Climate Change: Interpreting the TRIPS Agreement for Environmentally Sound Technologies" by Wei Zhuang.*
4. *The Greening of Intellectual Property: Rights, Competition, and Innovation" by Michael D. Mehta.*
5. *Intellectual Property, Innovation and the Environment" edited by Abbe E.L. Brown and Charlotte Waelde*
6. *Gattari, Patrick, The Role Of Patent Law In Incentivizing Green Technology, Northwestern Journal Of Technology And Intellectual Property, Vol. 11, Issue 2*
7. *Brant, Jennifer (2008), Green Technology Diffusion: Insights from Industry, available at http://www.wipo.int/wipo_magazine/en/2014/01/article_0002.html*
8. *Xu, Bin and Chiang, Eric, P (2005)., Trade, Patents and International Technology Diffusion, J. Int. Trade & Economic Development Vol. 14, No. 1*
9. *Green Intellectual Property as a Strategic Resource in the Sustainable Development of an Organization by Aldona Małgorzata Dereń*
10. *Green Technologies, Intellectual Property Regime and Climate Change by Sanaz Javadi Fara*
11. *The Role of Intellectual Property in Environmental Sustainability" by Christophe Germann*
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13. *Green Patents: Intellectual Property Strategies to Protect the Environment" by Bronwyn H. Hall, Christian Helmers, and Mark Rogers.*
14. *Intellectual Property and Climate Change: Inventing Clean Technologies" by Joshua Sarnoff,*
15. *Greening Intellectual Property: A Study of Environmental Patents in Brazil" by Guilherme de Oliveira and Ronaldo Fiani.*

[14] Intellectual Property and Climate Change: Inventing Clean Technologies" by Joshua Sarnoff
[15] Greening Intellectual Property: A Study of Environmental Patents in Brazil" by Guilherme de Oliveira and Ronaldo Fiani.