

The Laws on Cannabis in India: A Shift in Policy from Prohibition to Regulation for a Green Economy and Sustainability

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ABSTRACT

Cannabis, classified as a narcotic, has a rich medicinal and cultural history dating back to ancient times. Following the War on Drugs, the international community signed conventions on narcotic drugs, psychotropic substances, and their illicit trafficking. As a signatory to these conventions, India exercised its power under Article 253 of the Indian Constitution to enact domestic drug laws. The Center, as well as the States, has the authority to legislate and formulate policies on drug-related matters under the Concurrent List. Accordingly, the Union Government enacted “the Narcotic Drugs and Psychotropic Substances Act, 1985,” which imposed a blanket ban on the plant. However, the Act paved the way for states to regulate cannabis-related activities for medicinal, industrial, and research purposes, subject to the issuance of proper licenses by the concerned government authorities.

This paper examines the phased legalization of cannabis for medicinal and industrial use, considering global trends and the plant’s economic and sustainable value. While the central Act is primarily punitive, it does permit the use of the plant in medicine and industry. However, it lacks specific provisions for these permitted activities and does not clearly exempt them from its existing provisions that impose prohibitions. A global shift from prohibition to regulation could create a legal market, generating revenue through taxation, creating employment, and attracting investment in industries. Furthermore, the cultivation of industrial hemp is environmentally sustainable, as it requires less water and fewer pesticides, replenishes the soil, mitigates climate change, and lowers carbon footprints. Its biodegradable products provide for sustainable textiles, building materials, biofuels, and food. The paper argues that transforming the unregulated, illicit industrial hemp market into a transparent, legal one would significantly contribute to national and global sustainability goals and foster a green economic future.

Keywords: Cannabis, Medicinal, Industrial, Green Economy, Sustainability.

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1. INTRODUCTION

Cannabis: An Overview of Its Historical and Cultural Significance

Cannabis holds a traditional, cultural, and medicinal history dating back to ancient times in India. Cannabis has two meanings--one in the botanical sense and another in the legal sense. Botanically, it is a “genus of flowering plants in the family Cannabaceae.” At the same time, legally, under “the 1961 Single Convention on Narcotic Drugs and the Narcotic Drugs and Psychotropic Substances Act, 1985,” it refers to the preparations and derivatives of the cannabis plant. “The 1961 Convention and the 1985 Act also define the cannabis plant as any plant of the genus Cannabis.” Thus, terms like taxonomy, toxicology, and pharmacology are used in the context of cannabis. Taxonomy is inclusive of all plants, animals, and microorganisms of the world, which means “the science of naming, describing, and classifying organisms,” while toxicology is “the study of the harmful effects of chemicals, substances, or environmental agents on living systems.” Pharmacology, which differs from both toxicology and taxonomy, is “the science of drugs and their effect on living systems.

The current taxonomy of cannabis, which is the botanical classification system given by Linnaeus, follows a single-species model of Cannabis Sativa L. However, other botanists later identified “Cannabis sativa subsp. Sativa, Cannabis sativa subsp. indica, and Cannabis sativa subsp. ruderalis” as separate species, but these were eventually reclassified as subspecies or varieties of Cannabis Sativa L [1]. At present, it is a controlled narcotic drug under the 1961 Convention and the NDPS Act, 1985. However, before its criminalisation and penalisation, the plant had a deep-rooted traditional and cultural history and was widely used in industry, medicine, and recreation across the globe.

The earliest archaeological evidence suggests that the first domesticated cannabis use was reported around 12,000 years ago in the Neolithic age, near the Altai Mountains in East Asia, primarily for fibre obtained from hemp varieties and seeds as a food source. Cannabis use for medicine was recorded early in ancient China in the Shennong Bencaojing for its psychoactive as well as therapeutic properties [2]. It was later used to treat conditions such as rheumatic pain, gynaecological issues, constipation, and malaria. The Chinese surgeon Hua Tuo used a cannabis concoction as a sedative and analgesic.

Cannabis psychoactive use in Central Eurasia was documented by the Greek historian Herodotus, who described Scythians throwing cannabis onto red-hot stones and inhaling the vapour during purification rituals, shouting for joy [3]. Archaeological evidence also suggests that the Pazyryk, a sophisticated nomadic culture known for their Kurgan burial sites in the Altai mountains of Siberia, used a cannabis kit or inhalation set comprising carbonised hemp seeds, portable braziers, leather tents, and vessels for inhalation,

confirming this practice of ritual and purification. In the Indian Subcontinent, cannabis holds a special place in the Atharvaveda as one of the five sacred plants, described as a joy-giver, a source of happiness, and a liberator. God Shiva, the Lord of Bhang and Cannabis, is associated with them. Indian tradition holds a very deep historical significance of cannabis in medicine and recreation [4]. It was used as a medicine to treat eye diseases and inflammation, while the pollens of cannabis were found in the tomb of Pharaoh Ramesses II in ancient Egypt. The medicinal properties of cannabis, particularly in pain relief, along with its psychoactive properties, are documented by the Roman physicians Dioscorides and Galen.

Trade routes were the pathways of spreading cannabis to the Middle East, Africa, and Europe. Cannabis extracts in the 19th century had medicinal applications in treating pain, rheumatism, and convulsions, which an Irish physician, William Brooke O’Shaughnessy, documented [5]. In 1850, these extracts were not only widely available in Western pharmacies but were also listed in the U.S. Pharmacopeia. The medical texts of Galen and Pliny the Elder also mention the therapeutic properties of cannabis and its mood-enhancing capacity. In the Early 20th century, the public perception of cannabis began to shift. Cannabis tincture use was replaced by newer, chemically stable pharmaceuticals such as injectable drugs, aspirin, and barbiturates. Recreational use of cannabis became associated with Mexican and Caribbean immigrants, and later with Black jazz musicians, contributing to social unrest and the popularization of the term in the U.S. “Marijuana” to denote recreational use and evoke xenophobic sentiment. Following this shift, in 1937, the Marijuana Tax Act was enacted, criminalizing cannabis at the federal level through a regulatory taxation framework [6].

The Beat Generation in the 1950s, the Hippie Counterculture in the 1960s, and the anti-Vietnam War movement from 1964-1973 shifted the status of cannabis from being associated with marginalized and immigrant communities to becoming a symbol of cultural rebellion [7]. Three major international treaties were signed, that are, “the Single Convention on Narcotic Drugs in 1961, the Convention on Psychotropic Substances in 1971, and the UN Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances in 1988.” Although cannabis had cultural associations, “the Controlled Substances Act of 1970 in the U.S.” classified it as a Schedule I drug, meaning it has no accepted medical use but a high potential for abuse, thereby imparting it an illegal status that laid the foundation for the War on Drugs. Ongoing advocacy for the legalization and decriminalization of the use of medicinal and recreational cannabis has begun, and many countries have formulated new policies liberalizing the old, stringent legal and regulatory frameworks.

Regulation of Cannabis: Global Drug Control to National Legal Frameworks

The foundation for cannabis control to regulate non-medical and non-scientific activities was initially established by international treaties worldwide and subsequently followed by the enactment of domestic legislation in various jurisdictions. They are as follows:

The Single Convention on Narcotic Drugs, 1961

The United Nations adopted the primary treaty for drug control, consolidating previous international treaties into a unified framework. It limits the use and availability of narcotic drugs to medical and scientific purposes and seeks to combat the surging issue of drug abuse and trafficking by establishing “the International Narcotics Control Board (INCB).” Narcotic Drugs are categorized into four schedules, from Schedule I to IV, based on their abuse potential, medical utility, and level of control. The treaty terminated many earlier existing agreements, with the authority to supersede granted under Article 44 of the 1961 Convention, which deals with the “Termination of Previous Treaties.”

The Convention on Psychotropic Substances, 1971

This treaty covers a wide range of substances that have the potential for abuse and can cause health and social problems by controlling their use and distribution, which were previously not covered under the 1961 Convention. It ensures the availability of psychotropic substances only for medical and scientific purposes. Psychotropic Substances are categorized into four schedules, from Schedule I to IV, based on their potential for abuse, medical utility, and level of control.

The UN Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances, 1988

This treaty complements and supplements “the 1961 Single Convention on Narcotic Drugs and the 1971 Convention on Psychotropic Substances,” respectively, by taking measures to combat drug trafficking and the organized crime associated with it. It criminalizes money laundering related to drug offenses. It regulates the use and distribution of precursors, solvents, and other chemicals used in the illicit manufacturing of narcotic drugs and psychotropic substances, as well as other serious drug-related offenses.

The primary national legal frameworks of the selected jurisdictions are as follows:

The Controlled Substances Act (CSA) of 1970, the federal law of the U.S.

Cannabis was initially classified as a Schedule I drug and remained federally controlled, but in May 2024, it was proposed to be rescheduled to Schedule III, and the process is underway.

The Narcotic Drugs and Psychotropic Substances Act, 1985, the Drugs and Cosmetics

Act, 1940, and the Medicinal and Toilet Preparations (Excise duties) Act, 1955 of India

The status of narcotic drugs and psychotropic substances in India is regulated under the NDPS Act, 1985, while cannabis has been classified as a narcotic drug under the Act. The cultivation and other related activities are criminalized, with an exception for

medicinal purposes that require proper licensing from the respective state governments. The strict adherence to safety and quality standards of medicinal products derived from the cannabis plant is ensured by the 1940 Act, while the medicinal and toilet preparations containing alcohol, narcotic drugs, and psychotropic substances are levied excise duty under the 1955 Act.

The Drug Control Law of the People’s Republic of China

The use of Marijuana (Tetrahydrocannabinol or THC) is strictly prohibited and illegal for both recreational and medicinal purposes. However, exceptions include the cultivation of industrial hemp containing less than 0.3% THC for textile and fiber production under strict state regulation, and the use of cannabis seeds in Traditional Chinese Medicine.

The Controlled Drugs and Substances Act (CDSA) of 1996 and the Cannabis Act (Bill

C-45) of 2018 of Canada

The 1996 Act initially criminalized cannabis, but it was later legalized for adult recreational use in Canada by the 2018 Act.

Code de la santé publique (Public Health Code) of France

The non-medical use of cannabis and its derivatives is illegal and prohibited in France and may attract penalties. However, cannabis-based medicines are allowed under strict regulations. The Code also permits the industrial and commercial use of industrial hemp.

The Gesetz über den Verkehr mit Betäubungsmitteln (Betäubungsmittelgesetz –BtMG) (1981) (Narcotic Drugs Act) and the Gesetz zum kontrollierten Umgang mit Cannabis und zur Änderung weiterer Vorschriften (Cannabisgesetz – CanG) (2024) (Cannabis Act) of Germany

The 1981 Act initially criminalized the use of cannabis for both recreational and medicinal purposes. However, in 2017, medicinal use was allowed, and recreational use in small quantities was no longer prosecuted by the German states. The 2024 Act removed cannabis from the BtMG list of prohibited substances and legalized adult recreational use, setting fixed limits for possession and personal cultivation of the plant.

Law 1787 of 2016, Decree 613 of 2017, and Decree 811 of 2021 of Colombia

Law 1787 of 2016 legalized the scientific and medicinal use of cannabis through licensing from cultivation to manufacturing and export, while Decree 613 of 2017 set specific regulatory rules for the activities permitted under Law 1787, such as licensing, good manufacturing practices, and seed control. This was followed by Decree 811 of 2021, which legalized the sale of cannabis-based medicines and the export of dried cannabis flowers by licensed companies only.

The Narcotic Drugs Act of 1967 of Australia

The Act provides a regulatory framework for licensing and permits for the medicinal and research use of cannabis, while its recreational use is still federally prohibited.

The Medicines and Related Substances Act of 1965 and the Cannabis for Private Purposes Act (CfPPA) of 2024 of South Africa

The 1965 Act regulates the licensing, manufacturing, and distribution of cannabis for medicinal and commercial use, while the 2024 Act legalizes the recreational use of cannabis by adults for private use and allows specific limits for its cultivation, but not for the trade or commercial sale of recreational cannabis.

Hemp and Marijuana: The Varieties of Cannabis

Hemp and Marijuana are both varieties of the plant *Cannabis Sativa L.* They are categorized based on the presence of cannabinoid compounds in the plant. Cannabis contains over 550 compounds, with more than 100 identified phytocannabinoids responsible for imparting psychoactive and non-psychoactive (medicinal) effects [8]. Phytocannabinoids are the natural cannabinoids produced by the plant, while endocannabinoids are cannabinoids produced within the human body. Synthetic cannabinoids, however, are prepared in the laboratory. Cannabinoids are a broader term encompassing phytocannabinoids, endocannabinoids, and synthetic cannabinoids. The major phytocannabinoids are tetrahydrocannabinol (THC) and cannabidiol (CBD), known for their mind-altering and medicinal effects, respectively. There are also other minor cannabinoids such as cannabigerol (CBG), cannabinol (CBN), cannabichromene (CBC), and THCv (tetrahydrocannabivarin). Hemp varieties mostly have applications across medicine, industry, and nutraceuticals, while Marijuana varieties are mostly associated with recreation [9]. Medical Marijuana requires caution and advisory by an expert physician before being prescribed as medication and is mostly illegal in many countries, including India.

Industrial Hemp: A Green and Sustainable Form of Hemp

Hemp, having various applications in industry, is referred to as industrial hemp. Hemp includes medicinal, industrial, and nutraceutical types, which mostly depend on the applications and purpose of use. Hemp is a category characterized by low to negligible levels of Tetrahydrocannabinol (THC), below 0.3%, and high levels of Cannabidiol (CBD) [10]. It is applicable in almost every sector because of its non-psychoactive nature. Hemp possesses numerous environmental benefits compared to other traditional crops, and for this reason, it has been considered a green and sustainable variety of the cannabis plant. It is also known as a zero-waste plant, as unlike other conventional crops, every part of the hemp plant is utilized. Thus, the agricultural as well as the environmental advantages that are associated with the cultivation of industrial hemp are what make it the finest example of an eco-friendly crop [11]. It would not only prove to be a boon for environmental and socio-economic sustainability in India but also align with the 2030 Agenda of Sustainable Development Goals.

Problem Statement

The NDPS Act, 1985, is the central and traditional law of India that classifies cannabis as a narcotic drug and criminalizes and penalizes preparations and applications across various sectors from specific parts of the cannabis plant, along with its related activities. The stringent provisions of this Act effectively place a blanket ban on all cannabis related activities. However, the same Act exempts the industrial, scientific, and medicinal cultivation of cannabis, only through a license obtained with the approval of the respective state government, which is too inconsistent and non-uniform across different states of India.

The multi-sectoral applications of industrial hemp, along with its environmental and socio-economic benefits, cannot be overlooked simply because of regulatory and procedural inconsistencies. Thus, taking into account international treaty obligations and considering several case studies on business and market models for industrial hemp from other jurisdictions, India needs reform in its cannabis regulation laws and policies regarding industrial hemp.

Research Objectives

To examine the existing legal, regulatory, and policy frameworks on cannabis in India under the backdrop of international drug conventions and global perspectives.

To explore the contribution of industrial hemp in achieving environmental and socio-economic sustainability and development.

To analyze successful global models of industrial hemp businesses and markets for their potential integration into India.

To assess the challenges and limitations associated with the inclusion of industrial hemp in promoting multi-sectoral sustainability in India.

To suggest legal, regulatory, and policy reforms on cannabis and industrial hemp to facilitate environmental, social, and economic sustainability in India.

Research Questions

How do existing cannabis laws and the dynamic shift in industrial hemp policy support a green economy and multi-sectoral sustainability in India, in light of international conventions and global perspectives?

What benefits does the integration of industrial hemp offer across different sectors in India, and how does it promote environmental, social, and economic development in the country?

Research Methodology

Type and Nature of Research

The paper adopts qualitative, doctrinal, comparative, and analytical research methodologies, focusing on the analysis of legal texts, including domestic legislation from India and other leading jurisdictions, policy documents, legal literature, international drug conventions, scientific and academic literature, and cross-jurisdictional case studies.

Sources of Data

The Primary data sources involve the study of the Narcotic Drugs and Psychotropic Substances Act, 1985, along with state-level policies and initiatives

related to the cultivation of industrial hemp and the regulation of associated activities. It also includes judicial interpretations, reports from government committees and relevant ministries, international conventions, policy changes, as well as comparative laws, policies, and case studies from other jurisdictions. It also includes scholarly journal articles, legal commentaries, conference and seminar papers, reports by NGOs and think tanks, newspaper articles, media reports, and editorials.

Comparative Jurisdictional Analysis

The comparative jurisdictional analysis will include the study of legal, regulatory, and policy frameworks of industrial hemp and cannabis between India and jurisdictions such as the United States, China, France, Australia, Canada, South Africa, and Colombia.

Limitations of the study

It excludes empirical research. The primary focus of the research paper will strictly adhere to the legal, regulatory, and policy frameworks regulating industrial hemp in India through a comparative approach to analyze the stance of industrial hemp across selected jurisdictions. The study involves the legal examination of industrial hemp—a form of hemp and a variety of cannabis. It does not advocate the use of the entire cannabis plant but focuses only on a specific, non-psychoactive portion that has multi-sectoral applications.

2. CLASSIFICATION OF CANNABIS

Scientific Classification of Cannabis: Taxonomy and Chemical Profile

The scientific classification of cannabis involves species, subspecies, varieties, cultivars, and chemovars. These have an overlapping system of taxonomy and chemical profiles, as the former follows the latter. The existing classification system of the genus *Cannabis* includes a single species, *Cannabis sativa* L., given by Carl Linnaeus, and is the most widely accepted taxonomy so far. However, later, many other botanists identified “*Cannabis sativa* subsp. *sativa*, *Cannabis sativa* subsp. *indica*, and *Cannabis sativa* subsp. *ruderalis*” as distinct species, but they were later organized as subspecies or varieties of *Cannabis sativa* L [12].

Cultivars and chemovars differ from each other, as the former refers to cultivated varieties selectively bred for specific traits, while the latter involves categorization based on chemical profiles. Examples of cultivars include Northern Lights and Blue Dream, while examples of chemovars include Type I (THC-Dominant), Type II (Balanced THC or CBD), Type III (CBD-Dominant), and Type IV (CBG- Dominant). Hemp and Marijuana varieties of the cannabis plant are also based on the plant’s chemical profile, which cannot be overlooked, as it is the primary factor determining the psychoactive or non-psychoactive nature of the plant.

Legal Classification of Cannabis

The legal classification of cannabis is distinct from the scientific one, as it is more a result of historical,

political, and social factors that motivated and led to the signing of “the 1961 and 1971 Conventions on Narcotic Drugs and Psychotropic Substances, respectively” [13,14]. The 1961 Single Convention classifies cannabis as a narcotic drug, and this system of grouping has been adopted by other jurisdictions as well. The legal status of cannabis, along with its applications, differs from country to country, but there is global uniformity in considering cannabis a narcotic drug, even within domestic legislation. The reasoning behind this classification lies in the lack of research on the advantages and disadvantages of the plant at the time, as the early scientific community focused primarily on the plant’s psychoactive effects and its preparations, leaving its chemical profile largely unexplored. They also failed to give attention to the plant’s therapeutic potential.

The international community felt the need to classify cannabis as a narcotic drug alongside other hardcore drugs based on its potential for abuse, negative health effects on society, and the rising cases of drug menace. India is one such country and is a signatory to all three major drug control conventions of 1961, 1971, and 1988 [15]. The Indian Government enacted its primary legislation, the NDPS Act, 1985, by exercising its power under Article 253 of the Indian Constitution, 1950, and Article 47, which acts as a directive principle requiring the State to promote the welfare of its citizens by prohibiting intoxicating liquor and drugs except for medicinal and scientific purposes [16,17]. The NDPS Act, 1985, under Section 2(xiv), also lists cannabis as a narcotic drug alongside other hardcore drugs that differ in their chemical profile, pharmacology, and mechanism of action. This classification is based solely on the potential for abuse and the psychoactive preparations derived from the plant, but lacks evidence-based scientific backing.

3. INDUSTRIAL HEMP FOR ENVIRONMENTAL SUSTAINABILITY, SOCIAL INCLUSIVITY, AND A GREEN ECONOMY

Environmental, Social, and Economic Sustainability: Models of Green Business and Market

The concept of sustainable development is not standalone but requires collective and balanced efforts across the environmental, social, and economic domains, being interwoven concepts, they are interdependent. Multi-sectoral applications are associated with the industrial hemp plant since it is green and versatile in nature. The agricultural and environmental benefits are as follows:

Carbon Sequestration

Industrial hemp, in comparison to other conventional crops like cotton, wheat, and jute, absorbs large amounts of atmospheric CO₂ per hectare. Rapid growth, high biomass production, and dense canopy formation are some of its associated agricultural benefits. It helps in reducing the overall concentration of atmospheric CO₂ by trapping it from the air and storing it in the plants or soil.

Phytoremediation

Due to its fast growth, a deep and extensive tap root system, and high biomass production, which helps in absorbing and removing contaminants in the form of metals, pesticides, insecticides, and other toxic substances from the soil, thereby cleaning and rejuvenating soil and reducing land pollution, it is the finest example of phytoremediation. It detoxifies the soil as well as prevents the further spread of contaminants into the environment.

Crop Rotation

Industrial hemp is valued as a rotational crop as it offers multiple benefits for sustainable farming practices, including improving soil structure, suppressing weed growth, requiring minimal chemical inputs, and increasing crop yields. Industrial hemp is not susceptible to pests and diseases that affect other crops, and its deep root system promotes aeration and water filtration, benefiting subsequent crops. It reduces nutrient runoff and soil depletion by absorbing nutrients, along with the dense formation of a canopy that limits weed growth.

Minimal use of water and chemicals

It is a low-input crop, requiring relatively little water and minimal chemical fertilizers, insecticides, pesticides, and weedicides in comparison to other conventional crops. It has a deep root system that stores water deeper in the soil, reducing the need for constant irrigation. The plant is naturally resistant to pests and diseases, and its dense canopy formation suppresses weed growth. Thus, it not only minimizes resource use but also reduces pollution from chemicals used in agricultural practices.

Reduced Deforestation

It provides an alternative, sustainable replacement for wood-based products such as paper, textiles, and construction materials (for example, hempcrete). Hemp fibers are strong and durable, used to make fabrics, paper, and building materials, and the plant can be cultivated frequently due to its much faster growth rate. The demand for wood in making paper and fiberboard will decrease when replaced by hemp-based products, reducing the burden on forests. Industrial hemp plants can be grown on degraded lands without encroaching on or deforesting existing forests.

Zero Waste and Biodegradability

The plant is a zero-waste crop, as every part of it can be utilized, leaving little to no waste. The stalks provide strong and durable fibers used as a replacement for wood, the seeds are used for food and oil, while the leftover biomass is utilized as compost, biomass fuel, and animal bedding. Hemp-based products are biodegradable in nature, leaving behind no harmful environmental residues; they decompose and return nutrients to the soil. This promotes a circular economy based on the principles of reduce, reuse, and recycle.

Industrial hemp has the potential to drive social and economic development across multiple sectors, such as:

Agricultural and Rural Development

Industrial hemp has diverse applications across various sectors due to its versatility. It is a high-yield and valuable cash crop that can improve the economic conditions of farmers compared to other conventional crops. It is called a high-yield crop because it can produce a large quantity of fiber per hectare, and its cultivation cost is approximately 77% lower than that of traditional crops such as cotton. Different parts of industrial hemp, such as fiber, seeds, and biomass, can provide multiple income sources to low-income farmers through diverse, multi-sectoral applications [18]. With low capital requirements, minimal resource needs, and its role as a rotational crop, industrial hemp creates job opportunities in agriculture, manufacturing, processing, and distribution, thereby uplifting rural and regional economies.

Industry and Job Creation

The multi-sectoral application of industrial hemp requires skills and expertise across various sectors for the supply chain from cultivation to distribution and crop rotation. This demand can lead to the establishment of industries and the creation of green jobs across different domains. Employment opportunities will arise for farmers, laborers, and machinery operators on farms, as well as for research agronomists involved in the agricultural processes of industrial hemp. Additionally, hundreds of people can be employed in processing and manufacturing units, which will require capital investments and attract funding to local economies.

Industrial hemp also requires Research and Development in areas such as the scientific study of hemp, business and market models, and technological integration, all of which will generate job opportunities in the research field. Labeling, transportation, sales, marketing, and compliance with legal and regulatory frameworks will generate employment, while the industrial hemp use in construction materials, aerospace, automotive, and textiles, as well as CBD in medicine and hemp seeds in food and nutraceuticals, can potentially contribute to a higher GDP per capita in the regions where these industries are set up.

Case Studies from India and Other Jurisdictions on the Inclusion of Industrial Hemp for Multi-Sectoral Sustainability

The following case studies are from jurisdictions that have integrated industrial hemp into their economies to achieve environmental, social, and economic sustainability.

Case Study 1: Sustainable Construction in France

Hempcrete was used as a main material in the construction of the Pierre Chevet Sports Centre in France. It is a carbon-negative construction material, meaning that during production it absorbs more atmospheric carbon dioxide than it emits. It also offers excellent acoustic and thermal insulation while regulating moisture. The plant acts as a carbon sink and is also known for its soil regeneration capacity. Some of the companies of France and Poland, such as Safilin, are leading the Hemp4Circularity project,

aiming to build a local and circular hemp textiles industry [19].

Case Study 2: Sustainable Framing Practices in Southern Italy (Pignola)

Southern Italy (Pignola), a region with limited agriculture and water deficit, integrated the cultivation of industrial hemp as an alternative crop and proved its potential as a sustainable crop requiring no irrigation or chemical inputs. It is well-suited for crop rotation with cereals and improves soil fertility [20].

Case Study 3: Sustainable Food and Nutrition in North America

Hemp seeds and oils are rich in protein and fiber, and contain Omega-3 and Omega-6 fatty acids. They are sustainable sources of protein and nutraceuticals. Canada is one of the global leaders in producing and processing food sources and nutraceuticals from industrial hemp [21]. The 2018 U.S. Farm Bill federally gave industrial hemp the status of agricultural commodity and removed it from the list of controlled substances, thereby supporting U.S. textile companies, hemp-based fabrics, construction materials, and seed and fiber-based products [22].

Case Study 4: Energy Housing in the European Union

European governments are adopting strict net-zero building codes to meet the climate change goals of the European Green Deal by 2050 and are offering subsidies to promote sustainable construction materials like hempcrete, a hemp-lime product. Companies like IsoHemp of Belgium are taking initiatives to develop hemp-lime blocks and panels for a greener and faster building strategy [23]. Hempcrete is known for its moderate thermal conductivity, vapor permeability, and thermal mass, which help lower indoor temperatures and levels of humidity, regulate moisture, and prevent mold growth, thereby promoting good indoor air quality and health.

Case Study 5: Carbon-Negative Building Materials, Textiles, and Fiber in India

Hempcrete is known for being carbon-negative as well as for its acoustic and thermal insulation properties. An architect couple from Uttarakhand built a house using this sustainable material. Historical records also reveal that organic plasters and hemp fibers were used in the construction of the Ellora Caves in Maharashtra. Companies like GreenJams Infrastructure LLP are promoting hempcrete for sustainable construction in India.

Pilot projects in Uttarakhand and Uttar Pradesh, in collaboration with agricultural universities, are promoting the cultivation of licensed industrial hemp, as it costs 70% less than cotton and requires less irrigation. The fashion industry in India is witnessing a trend of promoting sustainable fabrics made of hemp, while BOHECO (Bombay Hemp Company), in collaboration with the Uttarakhand government, is working to develop technologies for processing industrial hemp fibers with little to no water usage for manufacturing composite materials [24].

4. FROM PROHIBITION TO REGULATION: LEGAL, REGULATORY, AND POLICY EVOLUTION OF CANNABIS AND INDUSTRIAL HEMP IN INDIA WITHIN THE CONTEXT OF GLOBAL DEVELOPMENTS

The comprehensive analysis of how the laws, regulations, and policies on cannabis and industrial hemp in India have evolved, influenced by geopolitical and historical factors, and viewed through the global lens of developing countries, must also adhere to international conventions. They are as follows:

Global shifts in Cannabis and Industrial Hemp

In the U.S., there is a federal-state conflict, with more than 38 states legalizing cannabis for medical purposes. However, more than 24 states, including D.C., have legalized it for recreational purposes as of 2024. Uruguay became the first country in the world in 2013 to fully legalize cannabis and regulate its market from cultivation to sale for adults. In 2018, Canada became the second nation to legalize the adult use of cannabis and regulate activities associated with it. The Supreme Court of Mexico decriminalized adult use in 2021, but regulation is still pending. Malta followed as the first European Country to legalize the adult use of cannabis. The UK, Netherlands, and Poland legalized the medicinal use of cannabis, though it is often restricted. Germany allowed medicinal use of cannabis but with restrictions, while in 2024, the government also allowed personal possession and personal cultivation for adults. Israel is a global leader in medicinal research and technology, along with a licensing and permit system in Australia for medicinal and scientific cannabis research.

Canada is a global leader in industrial hemp cultivation for food products and cosmetics made from hemp seeds, pharmaceutical-grade cannabinoid extraction, and bio-composites from fiber. The U.S. Farm Bill of 2018 recognized hemp as an agricultural commodity and allows applications across CBD, grain, and fiber. The European Union has permitted hemp seed varieties with THC not exceeding 0.3% for automotive parts, textiles, food sources, and construction materials, while France is the largest producer of hemp fiber, grains, and hempcrete. Switzerland has an interesting market, with a THC threshold not exceeding 1% for smoking hemp flowers and CBD products. China holds a global market share in producing and exporting hemp fiber and textiles, while Thailand legalized medicinal cannabis in 2018. In 2022, Thailand removed hemp and cannabis parts from its list of narcotics, becoming the first Southeast Asian country to produce medicinal, wellness, and consumer products.

India

The NDPS Act, 1985, classifies Cannabis as a narcotic and criminalizes its use. The only exceptions, under Sections 8 and 14 of the NDPS Act, 1985, are for medicinal, scientific, and industrial purposes. State governments have the power to issue licenses, but approval lies with AYUSH, CDSCO, and FSSAI, based on the application. In 2018, the cultivation and use of industrial hemp, with a THC threshold not

exceeding 0.3%, to obtain fiber and seeds was allowed by Uttarakhand, becoming the first state in India to make policies on industrial hemp. The Uttar Pradesh government has allowed the controlled cultivation of industrial hemp for textile use. The Government of Madhya Pradesh has announced plans to allow medicinal and industrial hemp cultivation. The Government of Himachal Pradesh is considering regulating the cultivation of hemp to boost the regional economy, while the Jammu and Kashmir government has framed rules for the cultivation of cannabis for research purposes under Section 10 of the NDPS Act, 1985.

5. CONCLUSION AND SUGGESTIONS

Summary of Key Findings

The findings are presented in response to the research questions:

The legal and regulatory frameworks of India are still evolving. There has been a recent shift in the policies of some states, since the matter of drugs is a matter of the Concurrent List, and the NDPS Act, 1985, though providing an exception for medicinal, industrial, and research cannabis, at the same time gives the power to award licenses for cultivation to the respective state governments. This power is too discretionary in nature, and such procedures of licensing are non-uniform across states. The 1961 Single Convention under Article 28, Paragraph 2, exempts the cultivation of industrial hemp, and there has been a global shift regarding the policies on industrial hemp, seen as a potential contributor to green and sustainable development.

Industrial hemp has multi-sectoral applications and has the potential to promote a green and circular economy, as it offers environmental, social, and economic benefits. There has been a global shift in the regulatory frameworks and policies regarding the hemp plant, and the reasoning behind this transition is the Research and Development (R&D) on the plant's advantages for the environment and how the supply chain from cultivation to distribution could change the socio-economic conditions of a country. Thus, green development and agricultural benefits are associated with the integration of industrial hemp in India for creating a sound and sustainable economy. Despite having such a rich historical background and cultural association with the cannabis plant, India still lags behind other countries in the existing restrictive laws and bottleneck policies on cannabis and hemp.

Integration of Industrial Hemp into the Sustainable and Green Development of India: Challenges

The interconnection between stringent regulations, insufficient Research and Development (R&D), lack of industrial infrastructure, and social stigma is a major obstacle in integrating industrial hemp into the green development of India.

The criminalization and penalization of cannabis as a narcotic drug under the NDPS Act, 1985, and the lack of explicit provisions for the cultivation, use, and application of industrial hemp are the most important

legal constraints. The status is further complicated by the discretionary powers of state governments in licensing hemp plants for medicinal, scientific, and industrial use, with different procedures across various states.

The legal and regulatory frameworks and the insufficient Research and Development (R&D) are proportional to each other, since without approval, no research can be conducted, especially by non-governmental institutions and independent researchers, thus maintaining the status quo of the plant in question. Industrial hemp requires manufacturing and processing units for fiber decortication, seed extraction, and CBD extracts, all of which are scarce in India. The establishment of processing plants, the application of new technologies, and advanced agricultural techniques require high investment.

Social stigma is associated with the criminalization of cannabis since the enactment of the NDPS Act, 1985, and hemp is often mistaken for the psychoactive marijuana. Hemp is often used interchangeably with charas, ganja, and bhang, and the reasoning behind this misunderstanding is the shared botanical origins or taxonomy of the plant, along with the legal classification of cannabis as a narcotic placed alongside other hardcore drugs. This creates a simplistic perception that narcotics are drugs and all forms of cannabis are illegal.

Concluding Remarks

The global transition from prohibition to regulation has prompted India to make an urgent move toward a change in regulation and policy, but this should align with the signed international conventions and not be inconsistent with them. This change should be motivated by evidence-based scientific research on the environmental, social, and economic benefits and developments from the cultivation of industrial hemp, along with how it will promote multi-sectoral sustainability. India should take a step forward, at least to liberalize the provisions of law, its regulation, and policy to the extent of medicine, industry, science, and research, to make its contribution to the global hemp market and align with the global sustainable development goals, innovation, and inclusivity, so that the history of traditional and cultural aspects, as well as applications of the plant, would be reflected in the future reformed policies on cannabis and industrial hemp.

Suggestions for Multi-Dimensional Reform in Cannabis Laws: Reconciling Law, Research, Science, Sustainability, and Economics

The following are the multi-dimensional suggestions for reformation in cannabis laws and industrial hemp policies:

There should be a uniform threshold of Tetrahydrocannabinol (THC) for clearly distinguishing psychoactive and non-psychoactive cannabis.

The removal of industrial hemp from the common definition of cannabis and the incorporation of explicit provisions to control and regulate activities regarding it under the NDPS Act, 1985.

The licensing procedures for state governments should be uniform, as this will remove inconsistency and non-uniformity and prove to be a boon for businesses and industries to set up.

For an Environmental Impact Assessment (EIA) of industrial hemp, allow institutions, organizations, and independent researchers to conduct scientific research.

To analyze the social and economic effects, launch pilot programs allowing cultivation of industrial hemp in different regions, set up industries, and promote business and markets.

This should be done by offering subsidies, involving agronomy scientists, providing technical assistance, exempting raw materials from taxation, levying excise duty on hemp-based products, and introducing a system of branding as a Geographical Indication.

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