ACADEMIC RESEARCH AND PATENT CULTURE IN INDIAN UNIVERSITIES

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ABSTRACT

India, with its expanding higher education ecosystem, is witnessing a growing emphasis on innovation and intellectual property. Academic research is a primary engine for technological advancement, yet the culture of patenting academic innovations remains nascent in many Indian universities. This paper explores the development of patent culture in Indian academia, analyses the legal and policy frameworks that promote or hinder it, and identifies systemic barriers impeding research commercialisation. Through comparative analysis with global patent practices in universities, this study suggests actionable recommendations to foster a more innovation-oriented academic environment. It emphasises the need for robust institutional IP policies, capacity-building, and legal reforms to enable Indian universities to become patent-rich hubs of the knowledge economy.

Keywords: Academic Research, Indian Universities, Intellectual Property, Patent Act, 1970.

INTRODUCTION

India's intellectual and academic capital is substantial, owing to a vast network of universities, IITs, NITs, and research institutes. However, despite a surge in academic research output, there exists a visible gap between research and innovation commercialisation. In developed economies, universities play a pivotal role in national innovation systems, especially through patent filings and technology transfers. Conversely, Indian universities lag in converting research into patents and marketable technologies. The importance of intellectual property (IP) rights—particularly patents—in promoting innovation, incentivising research, and enhancing industrial collaborations is well recognised under international legal frameworks such as the TRIPS Agreement and national regimes like the Indian Patents Act, 1970. Yet, a robust "patent culture" in Indian universities remains

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elusive. This article seeks to analyse the present status and challenges of academic research and patent culture in Indian universities. It explores the interplay of policy initiatives (such as the National IPR Policy 2016), legal frameworks, institutional attitudes, and socio-economic barriers that influence this domain. Additionally, it highlights global best practices and offers tailored recommendations for Indian academic institutions to bridge the gap between research and innovation.

LITERATURE REVIEW

The intersection of academic research and intellectual property in India has garnered increasing scholarly attention in the past decade. Several studies highlight a growing awareness of patents in Indian academia, yet they converge on the concern that systemic and cultural constraints hinder effective implementation. Basheer and Mani (2011) examined the nature of IP awareness among Indian scientists, concluding that most were unfamiliar with the nuances of patent law, leading to a low translation rate from research to commercializable innovations.

Similarly, Rakesh Basant (2007) argued that India's weak university–industry linkages obstruct the development of a knowledge-driven economy. The National Knowledge Commission (2006) emphasised the need to link higher education with innovation by promoting university patents. It recommended institutional reforms to enhance patenting capacity through training, financial support, and legal facilitation.

Meanwhile, Sharma and Sharma (2015) observed that even premier institutions like IITs and IISc faced bureaucratic and policy hurdles that disincentivise patent filings. The literature thus suggests that the development of a robust patent culture in Indian universities requires not only legal and policy reform but also a fundamental shift in institutional mindset and infrastructure.

LEGAL FRAMEWORK GOVERNING PATENTS IN INDIA

The Indian legal framework for patents is largely derived from the **Patents Act, 1970**, which has been amended multiple times to align with international obligations, especially the **TRIPS Agreement** under the WTO.

The Patents Act 1970 –

- Provides for a **20-year exclusive right** to inventors for their inventions, subject to conditions of novelty, non-obviousness, and industrial application.
- Does not distinguish between academic and non-academic inventors, treating university-generated inventions under the same provisions as private inventions.
- Post the **2005 amendment**, India began recognising product patents in all fields, including pharmaceuticals and biotechnology, offering broader protection for university-led innovations.

TRIPS Compliance and Its Impact: India's obligations under the **Trade-Related Aspects of Intellectual Property Rights (TRIPS)** have influenced the strengthening of its IP laws. Article 27 of TRIPS mandates that patents be available for all inventions, whether products or processes, in all fields of technology, without discrimination as to the place of invention. This has implications for university research, which must now compete under stringent global norms.

The National IPR Policy 2016 –

This policy recognises the role of academia in IP creation and commercialisation. It outlines several objectives relevant to academic institutions:

Objective 3: Strengthening IP creation through promotion of R&D and technology transfer.

Objective 5: Improving the legal and legislative framework to encourage IPR generation.

Objective 7: Strengthening human capital through training and education.

Universities are encouraged to establish **IPR Cells**, draft IP policies, and facilitate patent filing by offering administrative and financial support.

Bayh-Dole-type Proposals in India: Inspired by the Bayh-Dole Act of 1980 in the United States, which allowed federally funded research institutions to own patents arising from public funding, India has debated similar legislation. The Protection and Utilisation of Public Funded Intellectual Property Bill, 2008, attempted to formalise patent ownership by publicly funded institutions. However, due to criticisms about its rigidity and centralisation, the bill

was not passed. Despite this, many universities have independently adopted policies assigning IP ownership to the institution, with revenue-sharing mechanisms between researchers and the institution—a de facto Bayh-Dole approach.

CURRENT STATUS OF PATENT CULTURE IN INDIAN UNIVERSITIES

Research Output vs. Patent Output: India ranks among the top countries globally in terms of research publications. According to data from the **Department of Science and Technology (DST)**, India's scholarly output has grown substantially in the last two decades. However, this increase has not translated proportionally into patent filings. While countries like the United States and China have witnessed simultaneous growth in both research publications and patents, Indian universities still file a limited number of patents annually. The **World Intellectual Property Organisation (WIPO)** noted in its 2023 report that India ranked **7th globally in patent filings**, but the majority were by corporations like Tata, Infosys, and Reliance. Academic institutions accounted for less than 5% of the total filings.

Disparity among Institutions –

A critical issue in the patent culture of Indian academia is the **concentration of patents in elite institutions**. Institutions such as the **Indian Institutes of Technology (IITs)**, the **Indian Institute of Science (IISc)**, and **Council of Scientific and Industrial Research (CSIR)** labs account for over 80% of academic patent filings in India. For example:

- IIT Madras filed over 200 patents in 2022 alone.
- IISc Bangalore maintains a strong patent portfolio, including international patents.
- In contrast, state universities, central universities, and private colleges struggle to file even a handful of patents annually.

This disparity reflects differences in research funding, institutional priorities, infrastructure, and IP awareness.

Role of IPR Cells and Technology Transfer Offices (TTOs) –

Under the aegis of the National Innovation and Startup Policy (NISP) and National IPR Policy, universities have been encouraged to establish IPR Cells or Technology Transfer Offices. These are intended to assist researchers with:

- Patentability assessments
- Filing procedures
- Legal compliance
- Liaising with patent attorneys
- Licensing and commercialisation support

However, a study conducted by **AICTE in 2021** found that less than 25% of engineering colleges had functioning IPR Cells. Moreover, even among those that exist, many lack trained staff or standardised procedures.

Financial and Administrative Barriers –

Patent Filing Costs: The cost of filing and prosecuting a patent (especially international ones) can range between ₹30,000 to ₹2,00,000, which many universities or individual researchers cannot afford.

Delays in Processing: Bureaucratic hurdles often discourage researchers from pursuing patent applications. Prolonged delays in funding approvals and a lack of administrative coordination add to the frustration.

Lack of Incentives: Unlike publications, patents are often not rewarded in academic performance appraisals or promotions, leading to a lack of motivation among faculty.

Lack of Awareness and Training: Patent culture is also hindered by low awareness of IP rights among students and faculty. Many researchers inadvertently publish their work before filing a patent, thereby losing novelty—a key criterion for patentability. Regular training, seminars, and curriculum integration of IP laws are still in a nascent phase across Indian universities.

CHALLENGES HINDERING PATENT CULTURE IN INDIAN ACADEMIA

Despite various initiatives and reforms, the patent ecosystem in Indian academia faces several multi-dimensional challenges. These challenges range from institutional inertia and policy-level inconsistencies to systemic legal and socio-economic issues. This section outlines the major obstacles that restrict the growth of a robust patent culture in Indian universities.

Institutional and Cultural Resistance: One of the most pervasive challenges is the lack of institutional prioritisation of patents and innovation. Many universities in India still view research as a purely academic exercise, with an emphasis on publishing papers over creating intellectual property. The absence of a **"research-to-commercialisation" mindset** limits the pursuit of patentable ideas. Further, faculty members often resist additional administrative work involved in patent filings, especially when the academic reward system undervalues patents compared to peer-reviewed publications.

Inadequate IP Education and Capacity Building –

Indian universities rarely offer mandatory IP education as part of undergraduate or postgraduate curricula. Where offered, it is often optional or generic. The lack of formal training in:

- Patent law and procedures
- Technology transfer
- Licensing
- IP valuation

It prevents researchers from understanding the strategic value of protecting their inventions. Moreover, there is a **shortage of skilled professionals** within IPR cells or TTOs who can guide researchers through the patenting process.

Legal Ambiguities and Policy Gaps –

Although the **Patents Act 1970** applies uniformly to all inventors, it does not address academic-specific scenarios such as ownership rights in university-funded research. While some institutions adopt their own **IPR policies**, there is **no national law** similar to the **Bayh-Dole Act** that mandates the management and utilisation of publicly funded research.

This has led to:

- Confusion regarding ownership (whether the patent belongs to the university, the researcher, or both)
- Disputes over revenue-sharing models

- Lack of transparency in licensing procedures.

Funding Constraints –

Patenting, especially in high-tech fields like biotechnology, engineering, or pharmaceuticals, is an expensive and time-consuming process. Universities often lack adequate funding for:

- Drafting patent applications
- Filing in multiple jurisdictions (e.g., under the Patent Cooperation Treaty - PCT)
- Maintaining patent renewals

Although agencies like **DST**, **DBT**, and **ICAR** offer grants, they are limited and concentrated in a few elite institutions.

Lack of Industry Collaboration –

Industry-academia collaboration is essential for translating research into marketable technologies. However, in India:

- Industry partners often doubt the commercial viability of academic research.
- There is a **mismatch of expectations** between researchers and industrial stakeholders.
- Weak technology transfer frameworks inhibit successful IP commercialisation.

This results in many academic patents remaining dormant or unutilized due to a lack of market linkage.

Bureaucratic Delays and Procedural Complexity: Public universities are often subject to multiple layers of bureaucratic oversight. Any attempt to commercialise a patent or collaborate with private entities may require approvals from various internal committees, funding agencies, and government departments. This procedural complexity discourages both faculty and entrepreneurs.

Gender and Regional Disparities: Women researchers and institutions located in Tier II and Tier III cities face even more pronounced obstacles due to systemic biases, lack of mentorship, and limited institutional support for patenting efforts.

COMPARATIVE ANALYSIS WITH GLOBAL BEST PRACTICES

The patent culture in Indian universities can be better understood when placed in contrast with global practices, especially those in jurisdictions with strong university–industry innovation ecosystems. This section examines models from the United States, Europe, and Asia (particularly China and South Korea) to identify practices that may be adapted to the Indian context.

United States: The Bayh-Dole Model –

By enabling universities to keep ownership of discoveries created via federally sponsored research, the Bayh-Dole Act of 1980 revolutionised university patenting in the United States. Among the model's salient features are:

Institutional Ownership: Universities are entitled to patent discoveries funded by government grants.

Mandatory Commercialisation: Institutions must make efforts to commercialise the invention.

Revenue Sharing: Inventors are given a share of profits earned from licensing or sales.

Technology Licensing Offices (TLOs): Every major U.S. university now has a dedicated office for patent facilitation and industry collaboration.

Impact –

- In 2021 alone, U.S. universities filed over 18,000 patents and generated $2.9 billion in licensing revenue.
- The Act is credited with creating thousands of university-based startups and spin-offs.

European Union: Mixed Institutional Models –

The EU does not have a uniform patenting model. Different countries follow different approaches:

- Germany follows an inventor-ownership model with optional institutional support.

- Similar to the Bayh-Dole model, institutional ownership is practised in the UK.
- Many universities maintain Technology Transfer Offices (TTOs) funded partially by the government and partially by industry.

China: State-led Patent Expansion –

- Patent quotas for academic institutions.
- Massive state investment in research infrastructure.
- Patent subsidies and tax incentives for both universities and companies engaging in tech transfer.

Similar to the Bayh-Dole model, institutional ownership is practised in the UK.

South Korea and Japan: Industry Integration –

In South Korea, universities like **KAIST** and **POSTECH** operate with industry-like efficiency in IP management, aided by:

- Performance-based research funding
- Strong incentives for commercializable research
- Centralised government support for IP transfer
- Japan requires universities and the Japan Science and Technology Agency (JST) to work together on tech transfer and IP commercialisation.

Insights for India –

India can take away and modify the following lessons from this comparative analysis:

- Implement a Bayh-Dole-style legal structure for intellectual property that is sponsored by the government.
- To encourage teachers, institutionalise revenue-sharing schemes.
- Provide funding and support to all universities' Technology Transfer Offices.

- Encourage institutions to take advantage of national patent incentives, such as tax breaks and fee reimbursements.
- Establish federal patent consortia to assist state-level or smaller organisations in working together on technological commercialisation and patent filing.

CASE STUDIES AND EMPIRICAL DATA

To understand the actual ground realities of patent culture in Indian universities, it's essential to look at real-life data and institutional case studies. This section explores key academic institutions that have demonstrated noteworthy performance in intellectual property generation and the factors contributing to their success.

Indian Institute of Technology (IIT) Madras –

Overview –

- Known for its strong industry-academia collaboration.
- Houses one of the most prosperous incubation cells in India (IITMIC).
- Established a Research Park to commercialise academic innovations.

Patent Performance –

- Filed over 200 patents in 2022, with a focus on biotechnology, renewable energy, and smart devices.
- In partnership with industry leaders like Shell, Qualcomm, and Mahindra, IIT-Madras has successfully licensed multiple innovations.

Key Enablers –

- Dedicated IP Management Cell.
- In-house legal and patent experts.
- Performance-based incentives for faculty and students.

Indian Institute of Science (IISc), Bangalore –

Overview: IISc leads in patent filings among Indian research universities and has a culture of deep scientific inquiry paired with IP protection.

Patent Performance –

- Filed over 500 patents in the last five years.
- **Focus areas:** nanotechnology, materials science, and computational biology.

Innovative Approach –

- Collaborates with the Centre for Scientific and Industrial Research (CSIR) and DBT for funded research.
- Often conducts mock evaluations, patent writing sessions, and IP workshops.

Punjab Agricultural University (PAU) –

Overview: An excellent example of patenting in the agriculture sector—a relatively underrepresented domain in Indian patenting.

Patent Highlights –

- Developed multiple plant varieties that are now commercially cultivated across India.
- Collaborates with agricultural firms and state governments for licensing.

Key Takeaway: With minimal technology infrastructure, PAU showcases how domain-specific knowledge and public interest orientation can still lead to impactful patents.

Banaras Hindu University (BHU) –

Overview: One of India's largest universities, BHU, has recently revamped its approach to innovation through the establishment of its Technology Enabling Centre (TEC), funded by DST.

Patent Data –

- Increase in patent filings from 5 in 2018 to 37 in 2023.

- Focused on pharmaceuticals, metallurgy, and environmental technologies.

Strategic Shifts –

- Introduction of incentives and revenue-sharing.
- Regular capacity-building programs for researchers.

Statistical Insights from DIPP, WIPO, and NRDC –

- As stated by the Department for Industry and Internal Trade Promotion (DPIIT):
- Over 90% of Indian universities filed fewer than 10 patents per year between 2015 and 2021.
- The World Intellectual Property Indicators (2023) show that:
- Indian universities filed only 3% of the total national patent applications.
- The National Research Development Corporation (NRDC) reveals that only 12% of filed patents from universities have been licensed for commercialisation.

Summary Table: Indian Universities and Patents (2022)

Institution	Patents Filed	Patents Granted	Licensed Technologies	Notable Domains
IIT Madras	210	125	34	Engineering, Clean Tech
IISc Bangalore	130	90	28	Nanotech, Biology
IIT Bombay	98	74	19	Electronics, Pharma
Amity University	45	20	5	Biotechnology, Food Tech

Institution	Patents Filed	Patents Granted	Licensed Technologies	Notable Domains
Punjab Agricultural Univ.	35	26	12	Agro-tech, Seed Varieties
BHU	37	18	6	Metallurgy, Environmental

RECOMMENDATIONS FOR ENHANCING PATENT CULTURE IN INDIAN UNIVERSITIES

Based on the challenges identified and comparative insights gathered, it is clear that Indian universities require a **multi-layered, systematic transformation** to develop a vibrant patent culture. The following recommendations are intended to guide policymakers, university administrators, and researchers toward strengthening the ecosystem.

1. **National-Level Policy Interventions**

Enact a Bayh-Dole-type Legislation –

India needs a **legally binding framework** to assign ownership of IP developed through public funding to universities, similar to the U.S. Bayh-Dole Act. This will:

- Clarify ownership rights
- Mandate commercialisation efforts
- Standardise benefit-sharing between universities and inventors

Expand and Enforce the National IPR Policy –

The **National IPR Policy (2016)** should be updated with **concrete guidelines and performance metrics** for higher education institutions, including:

- Minimum annual patent filing benchmarks.
- Mandatory creation of IP Cells.

- Tracking of tech transfer outcomes.

2. **Institutional Reforms**

Establish Fully Functional IP Cells and TTOs –

Every university should have a dedicated **Technology Transfer Office (TTO)** or **IPR Cell** equipped with:

- Legal experts and patent agents.
- Access to patent databases and prior art search tools.
- Templates for licensing agreements and NDAs.

Develop Institutional IP Policies –

Universities must implement clear IP policies outlining:

- Ownership rights
- Revenue-sharing models (e.g., 70:30 or 50:50)
- Conflict-of-interest clauses
- Roles and responsibilities in the commercialisation process

Incentivise Researchers –

Incorporate **patent output as a key performance indicator (KPI)** in the following:

- Faculty recruitment and promotion
- Research funding allocation
- Award schemes and recognitions

3. **Financial and Infrastructural Support**

Patent Filing Grants –

Provide grants (through DST, AICTE, UGC, DBT) specifically for the following:

- Patent drafting and attorney fees
- Filing fees for domestic and international applications
- Maintenance and renewal costs

Centralised Patent Consortia –

Create **state-wise or zonal patent consortia** for resource-sharing among smaller universities. These can:

- File group patents
- Pool research findings
- Share legal and administrative costs

4. **Industry: Academia Collaboration**

Formalise Collaboration Platforms –

- Create **state-backed industry-academia networks**, similar to the UK's **Catapult Centres** or Germany's **Fraunhofer Institutes**.
- Launch joint R&D labs where universities and companies co-own resulting IP.

Promote University Startups –

- Strengthen incubation centres.
- Enable **start-up formation around university-owned patents**.
- Provide equity-based support in exchange for licensing agreements.

5. **Human Capital Development**

Integrate IP Education –

Include compulsory modules on:

- Patent law and procedures

- Licensing and entrepreneurship

IP ethics and compliance in all technical and research-oriented degree programs.

Conduct Regular IP Workshops –

Partner with:

- **Patent Offices (IPO, WIPO)**
- **NRDC and TIFAC**
- **Bar councils and law schools**

To organise hands-on training, bootcamps, and certificate courses for faculty, research scholars, and students.

Data Transparency and Monitoring –

Create a **national IP database for universities** managed by UGC or DPIIT, which:

- Tracks filed, granted, and commercialised patents.
- Highlights successful case studies.
- Benchmarks institutional performance annually.

CONCLUSION

India's higher education system is at a pivotal juncture. With its vast academic and human capital, it holds enormous potential to become a global hub for innovation. However, the present disconnect between academic research and intellectual property creation is a critical gap that undermines the country's aspiration to build a robust knowledge economy.

The analysis reveals that while Indian universities are producing a high volume of research, their contribution to patent filings and commercialisation remains dismally low. The situation is compounded by institutional inertia, legal ambiguities, funding limitations, and the absence of a culture that views patents as valuable academic output. Despite the challenges, success stories from institutions like IIT Madras, IISc Bangalore, and Punjab Agricultural University demonstrate that it is possible to overcome structural limitations with the right mix of vision,

policy, and institutional commitment. International models, especially from the U.S., China, and South Korea, offer valuable insights on how legal reform, institutional autonomy, and industry integration can empower academia to lead innovation.

POLICY OUTLOOK

To realise the full potential of academic innovation in India, the path ahead requires coordinated and strategic action by all stakeholders:

Legislators must move towards enacting a clear legal framework, akin to the Bayh-Dole Act, to govern publicly funded IP.

Regulatory bodies like UGC, AICTE, and DPIIT must enforce standards for institutional IP practices and provide funding support.

Universities must treat patenting not as a bureaucratic checkbox but as a pillar of their research mission.

Faculty and researchers must be educated, incentivised, and supported to view their innovations as assets of national and commercial value.

The **vision of Atmanirbhar Bharat (Self-Reliant India)** depends significantly on its ability to transform academic research into homegrown technologies and indigenous innovations. This transformation is impossible without a thriving, inclusive, and strategic patent culture rooted in Indian universities.