PATENT-BASED TECHNOLOGY TRANSFER: A COMPARATIVE LEGAL ANALYSIS OF INDIA AND THE UNITED STATES

Riya Yadav, LLM (IPR), Amity Law School, Amity University, Noida

ABSTRACT

Technology Transfer is an essential transactional framework for the transfer of publicly financed research from university to market as commercial products and socially beneficial services. In knowledge-based economies, the efficiency of technology-transfer systems is a key determinant for both the capacity to innovate and hence industrial competitiveness as well as for public return on investments in research. This paper performs a comparative legal review of patent-based technology transfer systems in India and the United States, focusing on ownership distribution, licensing mechanisms, regulatory monitoring and institutional administration. The Bayh-Dole Act enacted in the United States, is a comprehensive legislative model granting ownership of federally funded inventions to research organisations along with disclosure requirements, freedom to license and limited government rights. However, India does not have an integrated legislation on public funded IPRs and it has resorted to piecemeal legislations/ rules (patent law, contract law, foreign exchange regulation, competition law) and executive policy instruments. This paper considers how that regulatory divergence impacts on commercialization outcomes, agency accountability and market entry. Looking at statutory language, caselaw, and administrative practices, the Article contends that selective emulation of Bayh-Dole–type mechanisms (rather than blanket importation) is key to ensuring a technology-transfer environment in India that robustly protects public interest and maintains balance in regulation.

Keywords: India, USA, Technology, Patent, Innovation, Technology transfer.

INTRODUCTION

Technology transfer occupies a central position in contemporary innovation governance, functioning as the legal and institutional bridge between publicly funded research and market oriented technological application. In an era marked by rapid scientific advancement and intensifying global competition, the effectiveness of a country's technology-transfer framework increasingly determines its capacity to translate research outputs into economic value and societal benefit. For developing economies such as India where the State remains a major funder of scientific research through public universities, national laboratories, and government-funded research institutions the legal regulation of technology transfer, and specifically the allocation of patent ownership and licensing authority, assumes critical importance.[1]

The United States provides a mature and instructive statutory model for regulating technology transfer through the Bayh-Dole Act (Patent and Trademark Law Amendments Act), which is codified at 35 U.S.C. §§ 200–212 and accompanied by a rich administrative and scholarly infrastructure supporting university ownership, disclosure obligations, licensing norms, and limited "march-in" rights.[2] Legal and empirical research demonstrates that Bayh- Dole led to a substantial reconfiguration of university–industry interactions, the motivation for institutional attempts at patenting and licensing, and the constitution and professionalisation of technology transfer offices (TTOs) within academic institutions.[3] The academic critics have raised issues such as patent quality, research direction and access to downstream products that may help in achieving a more detailed perspective on the effects of the Act.[4] In contrast, India does not have a single statute that regulates uniformly both ownership and commercialisation of publicly funded inventions. While the Patents Act, 1970 continues to be the main statutory framework for granting, assignment and licensing of patents, it does not provide any explicit regime for title or licensing rights in inventions developed from public funding along the lines

[1] David C. Mowery, Richard R. Nelson, Bhaven N. Sampat & Arvids A. Ziedonis, *Ivory Tower and Industrial Innovation: University–Industry Technology Transfer Before and After the Bayh-Dole Act* 1–25 (Stanford University Press, 2004).
[2] Rebecca S. Eisenberg, "Public Research and Private Development: Patents and Technology Transfer in Government-Sponsored Research' (1996) 82 *Virginia Law Review* 1663, 1663–1727.
[3] Bayh-Dole Act, 1980, 35 U.S.C. §§ 200–212, available at https://www.unemed.com/wpcontent/uploads/2015/06/35-U.S.C.-200-212-Bayh-Dole-Act.pdf (last visited 10 Feb. 2026).
[4] Arti K. Rai & Rebecca S. Eisenberg, 'Bayh-Dole Reform and the Progress of Biomedicine' (2003) 66 *Law and Contemporary Problems* 289, 289–314.

of Bayh-Dole.[5]

Rather, transfer of technology is regulated under a fragmented regime of contract law (Indian Contract Act, 1872), foreign exchange measures (Foreign Exchange Management Act, 1999; the Foreign Exchange Management (Current Account Transactions) Rules, 2000), competition law (Competition Act, 2002), and an array of policy instruments including National Intellectual Property Rights Policy (2016). The multi-instrument design has led to legal ambiguity and uneven institutional practices in terms of ownership, freedom to license, and the accountability of public research institutions. [6] India has periodically explored more cohesive statutory approaches most notably the draft "Protection and Utilisation of Public Funded Intellectual Property (PUPFIP) Bill, 2008 but such proposals have not been enacted into law, leaving policy pronouncements and institution-level practices as the dominant mechanism for technology transfer.[7]

Academic studies and government reports point to gaps in capacity (underdeveloped TTOs), procedural bottlenecks, and regulatory overlaps that limit effective commercialisation of publicly-funded IP in India.[8] This article conducts a comparative law analysis of technologytransfer regimes in India and the US, centring around patent regime and regulatory design. (i) The legal and procedural journey in patent-centric transfer of technology, (ii) mapping the Indian legislative landscape including policy for transferring public funded inventions; (iii) understanding the impact of statutory clarity given by Bayh-Dole regime on US experience; and iv) recommending select legislative and institutional reforms for India – namely, rethinking ownership allocation (ownership); licensing autonomy (licensing); reporting how-to and accountability expectations from publicly-funded institutions; competition-compliant licensing practices. The analysis suggests that the selective borrowing of Bayh-Dole-like legal devices rather than total doctrinal transplantation can effectively correct the structural weaknesses in India's current system and bring public research

[5] The Patents Act, 1970 (India), ss. 6, 48, 68–69, available at https://ipindia.gov.in/writereaddata/portal/ipoact/1_31_1_patent-act-1970-11march2015.pdf (last visited 10 Feb. 2026).
[6] Indian Contract Act, 1872, available at https://www.indiacode.nic.in/handle/123456789/2187 (last visited 10 Feb. 2026).
[7] Foreign Exchange Management Act, 1999, available at https://www.indiacode.nic.in/handle/123456789/2005 (last visited 10 Feb. 2026).
[8] Foreign Exchange Management (Current Account Transactions) Rules, 2000, available at https://www.indiacode.nic.in/handle/123456789/2027 (last visited 10 Feb. 2026).

expenditures more in line with innovation driven economic growth.[9]

CONCEPT AND PROCESS OF TECHNOLOGY TRANSFER

Technology transfer refers to process of transferring scientific knowledge, inventions and technologies or associated technical know-how from the research-generating entity to actors that are able to convert them into commercial products or goods for wider economic and societal benefit; increasingly seen as a legally facilitated or mediated rather than simply commercially or managerially-driven activity. In modern innovation systems, and especially valuable for publicly funded research, technology transfer is rooted in regulatory norms regarding IP ownership, the contracting or allocation of rights (including data), disclosure requirements, regulatory compliance and considerations relevant to competition. The notion therefore includes not just the transfer of physical property rights but also that of tacit knowledge, proprietary information and technology collaborations – all which are regulated through formal legal determinants (e.g., licensing agreements, research collaboration contracts, material transfer agreements, confidentiality pacts) using national and international based legal systems.[10]

Technology transfer is initiated by identification and evaluation of a potentially protectable invention, including the strategic decisions on means for protection and exploitation. Legal academic literature highlights that the choice of an exclusive versus non-exclusive license, assignment, or collaborative development is influenced by regulatory requirements and publicinterest obligations as well as institutional mandates placed on publicly funded research institutions.[11] Patent filing and prosecution represent a critical intermediary stage, as enforceable intellectual property rights provide the legal basis for downstream licensing and commercialisation, particularly in cross-border contexts where harmonised procedural mechanisms under international treaties facilitate jurisdictional expansion of protection.[12]

As a result, technology transfer frequently takes the form of proof-of-concept validation or sponsored research and development, or joint development agreements that have both

[9] Competition Act, 2002, available at https://www.indiacode.nic.in/handle/123456789/2050 (last visited 10 Feb. 2026).
[10] John H. Barton, *Technology Transfer in the Global Economy* 3–27 (Cambridge University Press, 2007).
[11] Ashish Bharadwaj, 'Innovation, Access and Patent Licensing: Policy Trade-Offs in Technology Transfer' (2014) 6 *NUJS Law Review* 115, 118–136.
[12] Carlos M. Correa, *Trade Related Aspects of Intellectual Property Rights: A Commentary on the TRIPS Agreement* 221–245 (Oxford University Press, 2007).

technical and legal effects—such as decreasing information asymmetries between licensors and licensees and clarifying liability, ownership of improvements, risk sharing. From a legal perspective, these phases raise concerns about compliance with competition law principles applicable to the regulation of restrictive licensing practices, in particular where standard-essential technologies or dominant market positions are concerned. Comparative studies indicate that regulatory review of the licensing contract is necessary to avoid the foreclosure of competition while maintaining innovation incentives.[13]

The last step of the technology-transfer pathway involves commercialization, and manufacturing deployment and introduction to the market will draw sectorial regulatory approvals, public policy safeguards, or use obligations (or post-use information) made by funders and policy-makers. There is a growing recognition in the legal literature that not only institutional capacity but also the coherency and predictability of the legal regime at these particular stages determine whether technology transfer will be productive. Disjointed regulation, duplicated compliance needs and unclear ownership or enforcement models can be serious obstacles to commercialisation results. As a result, modern scholars have called for a comprehensive legal model that brings patent law, contract, regulation and competition principles into harmony to secure diffusion of innovation alongside public accountability.[14]

CORE MECHANISMS OF TECHNOLOGY TRANSFER

Licensing and Rights Granting

In the early stage of technology transfer, licensing and entitlement play a role as a basis for later operation. It includes contracts between the technology provider (licensor) and the recipient (licensee), which specify the terms under which intellectual property rights will be transferred. These agreements cover things like extent of use of technology, limitations, rates, copyrights and confidentiality just to name a few. The mechanism of issuing licenses is a legal barrier to ensure fair and transparent transfer of technological assets.[15]

[13] Organisation for Economic Co-operation and Development, *Competition Policy and Intellectual Property Rights* 45–78 (OECD Publishing, 2019), available at https://www.oecd.org/competition/ip-competition.htm (last visited 10 Feb. 2026).
[14] United Nations Conference on Trade and Development, *Transfer of Technology and Knowledge Sharing for Development* 11–39 (UNCTAD, 2020), available at https://unctad.org/system/files/officialdocument/dtlstict2020d1_en.pdf (last visited 10 Feb. 2026).
[15] Somaya, Deepak, and D. Teece. 'Patents, licensing, and entrepreneurship: Effectuating innovation in multiinvention contexts.' *Shashinski, Č E., Strom, RJ, Baumol, WJ Entrepreneurship, innovation and the growth mechanism of the free enterprise economise, US* (2021): 185-212.

Proof-of-Concept (PoC) Projects

PoC projects involve proving, in small scale, the viability of technology by demonstrating its practical application in real world contexts. The UAV related programs have been initiated for various purposes, such as testing feasibility, identifying potential obstacles or constraints, and obtaining approvals from stakeholders. In the backdrop of upcoming innovation ecosystems, such as India, PoC projects gain even more traction because they serve as a real platform and catalyst for startups and entrepreneurs to validate their ideas and draw investment into them.

Continuous Research & Development (R&D)

Technology is dynamic in nature and always evolving due to continuous improvement. Therefore, continued investment in R&D is required to achieve long-term relevance and competitiveness of technologies transferred. Ongoing R&D work also helps to tackle new challenges as they arise, learn from feedback by end-users and capture new innovation opportunities. Furthermore, R&D can also include an adaptation of the transferred technology to match particular market demand, technical regulations or environmental aspects. The creation of dedicated R&D centres or relationships with research organizations also help drive continued innovation and adaptation.

EVOLUTION OF TECHNOLOGY TRANSFER IN INDIA

India after Independence pursued self-reliance and economic development as its mission by preparing the ground for indigenous innovation. Public sector undertakings were at the centre of this effort and its focus extending to technology transfer in agriculture, aviation, energy etc.

But it is the opening up of economy and its integration with world in early 1990s which changed India’s policy towards technology transfer. As trade barriers fell and the Indian economy’s doors were thrown open, India began to embrace greater convergence with global partners, leading to a rise in technology inflows as well as cross-border investment. Looking to the future, India is still committed to using technology transfer as a means of spurring socio-economic development and global competitiveness. "India aspires to be a $5trillion economy and for that, good innovation culture, R&D, infrastructure facilities and international collaborations are crucial." Through technology transfer, it wants to leverage its natural and human capital resources not just for itself but for the world at large and be a part of the global

fraternity by bringing in the better fruits of technology.[16]

REGULATORY FRAMEWORK GOVERNING PATENT AND TECHNOLOGY TRANSFER IN INDIA

Patent Ownership, Assignment, and Licensing under the Patents Act, 1970

Patent technology transfer's legal base in India is founded on the Patents Act, 1970 that identifies not only the nature of patent rights but also sets forth legally allowed ways to transfer these rights. Patentee rights Section 48 of the Act provides patentees with an exclusive right to preclude others from 'making, using, exercising, selling or importing' the patented invention (transforming the patent into a commercially enforceable legal asset capable of being licensed [as] or assigned).[17] Technology transfer is primarily operationalised through Sections 68 and 69, which mandate that assignments and licences of patents must be in writing and duly registered with the Controller of Patents to be legally effective.[18] These provisions are critical, as unregistered transfers are unenforceable against third parties, directly affecting commercial certainty and risk allocation in technology transfer transactions.

Further, Sections 83 and 84 embed public-interest considerations into patent exploitation by emphasising that patents should be worked in India and made available at reasonable prices.[19] These provisions exert indirect pressure on licensing negotiations, particularly in sectors such as pharmaceuticals, clean energy, and agricultural technology, where failure to adequately commercialise may expose patentees to compulsory licensing. Technology transfer in India therefore operates within a statutory framework that balances private exclusivity with public welfare, influencing both the scope and structure of licensing arrangements.

Contractual Validity and Foreign Exchange Regulation of Technology Transfer Agreements

Though the proprietary rights fall under the aegis of patent law, enforceability in respect of

[16] Tuli R, 'Technology Transfer-A Necessity For The Growth Of The World Economy' (New Technology - India, March 30, 2023) <https://www.mondaq.com/india/new-technology/1299444/technology-transfer-a-necessity-forthe-growth-of-the-world-economy> accessed March 28, 2024
[17] P. Narayanan, *Patent Law* 251–276 (4th edn, Eastern Law House 2017).
[18] S. Venkateswaran, *The Law of Patents* 463–479 (LexisNexis 2019).
[19] Biswajit Dhar & Reji K. Joseph, 'Public Interest Safeguards under the Indian Patent Regime' (2019) 24 *Journal of Intellectual Property Rights* 1, 6–18.

technology transfer agreements is grounded on Indian Contract Act, 1872. 10 and 23 deal with contracts for the transfer of technology and stipulate that such contract must be under lawful consideration, a lawful object, a contravention of statutory prohibition or against public policy renders the agreement void. This is particularly the case regarding clauses on confidentiality, non-compete duties, exclusivity and termination (as appropriate) that should be meticulously written so as to be legally enforceable. The remedies of breach, damages and specific performance are also based on the common law of contract that influence enforcement tactics in technology transfer disputes.[20]

Cross-border transfer of technology adds another layer of regulation under the Foreign Exchange Management Act, 1999. Royalties, lump-sum fees licensing agreement and technical service charges are regulated under the Foreign Exchange Management (Current Account Transactions) Rules, 2000 specifically Rule 4 of transactions requiring prior approval. India has been progressively liberalising foreign technology collaborations, with reporting requirements to the authorised dealer banks and RBI directions being the only stipulated conditions. Accordingly, the international transfer contract should have a consistent structure between contractual contents with foreign exchange constraints in order to prevent invalidation due to regulations.[21]

Competition Law Constraints and Institutional Regulation of Technology Transfer

Software or technology transfer agreements are also examined under the Competition Act 2002, specifically Sections 3(4) and 4 which pertain to vertical restraints and abuse of dominance. Licensing conditions including exclusive dealing, tying arrangements, grant backs and territorial restrictions can raise antitrust concerns when they have appreciable anticompetitive effects. The CCI has been increasingly acknowledging that although patent licensing is pro-competitive per se, restrictive conditions can illegally prolong market power beyond the scope or duration of the patented item. In publicly funded research institutional regulation also determines technology transfer. Research institutions and universities are governed by internal IP & technology transfer policies formulated in compliance with executive instructions of the funding agencies. These policies cover disclosure of inventions, sharing of revenue among inventors and the institution, and how licensing and spin-offs will

[20] Avtar Singh, *Law of Contract and Specific Relief* 145–168 (13th edn, Eastern Book Company 2020).
[21] Reserve Bank of India, *FAQs on Foreign Technology Collaboration and Royalty Payments*, available at https://www.rbi.org.in/Scripts/FAQView.aspx?Id=26 (last visited 10 Feb. 2026).

be approved. Whilst not being of statutory origin, such institutional regulations take on legal significance by becoming part of the employment and funding contracts with attendant effects on ownership and commercialisation.[22]

COMPARATIVE ANALYSIS OF PATENT AND TECHNOLOGY TRANSFER: INDIA AND THE UNITED STATES

United States

The U.S. legal regime for technology transfer is anchored in the **Bayh-Dole Act** (codified at 35 U.S.C. §§200–212) and a dense administrative and institutional practice that makes patents arising from federally funded research readily licensable by universities and non-profits.[23] The statutory design vests institutions with title subject to disclosure and government rights (including narrow 'march-in' authority under 35 U.S.C. §203), while professional technology transfer offices (TTOs), venture capital markets, and a permissive licensing culture operationalise commercialisation.[24] The law thus aligns institutional incentives (ownership, revenue sharing) with private sector capacity to scale inventions, but it also embeds accountability mechanisms and reporting duties to funding agencies.[25]

Judicial developments have shaped the contours of ownership and inventor assignment: in Stanford Univ. v. Roche, the U.S. Supreme Court held that inventors' assignments to third parties could vest title outside the university absent clear contractual assignment, underscoring the need for precise inventor-employment agreements and assignment clauses in university appointments.[26] This decision prompted many institutions to tighten employment-assignment language and to review TTO practice on inventor disclosures and execution of assignments.

Policy debates continue over the unused but politically salient 'march-in' authority and

[22] Competition Commission of India, *Market Study on Competition Issues in the Pharmaceutical Sector in India* 82–104 (2021), available at https://www.cci.gov.in/reports/market-study-pharmaceutical-sector (last visited 10 Feb. 2026).
[23] U.S.C. §§ 200–212 (Bayh-Dole Act), available at https://www.govinfo.gov/content/pkg/USCODE-2011title35/pdf/USCODE-2011-title35-subtitleII-chap18.pdf (last visited 10 Feb. 2026).
[24] Congressional Research Service, *Pricing and March-In Rights Under the Bayh-Dole Act* (IF12582) (Dec. 3, 2024), available at https://crsreports.congress.gov/product/pdf/IF/IF12582 (last visited 10 Feb. 2026).
[25] National Institutes of Health, *Bayh-Dole Implementation & Reporting Guidance* (agency guidance pages), available at https://www.nih.gov/about-nih/what-we-do/nih-almanac/bayh-dole-act (last visited 10 Feb. 2026).
[26] Board of Trustees of Leland Stanford Junior Univ. v. Roche Molecular Sys., Inc., 563 U.S. 776 (2011); see also Supreme Court briefing and opinion, available at https://www.law.cornell.edu/supct/html/09-1159.ZO.html (last visited 10 Feb. 2026).

pricing/access implications for technologies commercialised under Bayh-Dole. Empirical surveys of U.S. licensing activity (such as AUTM licensing surveys) show sustained university licensing and start-up formation, indicating that the statutory framework, plus a supporting innovation ecosystem (incubators, SBIR/STTR funding), effectively translates public research into commercial activity while raising recurring public-interest questions about access and exclusivity.[27]

Regulatory details (federal agency implementing rules, patent prosecution pathways, NIH/agency reporting guidelines) and case law together create a predictable, patent-centric transfer architecture yet one that requires careful contract drafting, adherence to funding conditions, and awareness of competition and procurement law where downstream access is implicated.[28]

India

India's legal framework for patent-based technology transfer is plural and statute-linked rather than unified by a single public-fund IP ownership law. The Patents Act, 1970 supplies the core property rules (assignment, licensing, registration of transfers), and Sections such as those concerning compulsory licensing and 'working' have concrete implications for how licences are negotiated and enforced in public-interest sectors.[29] However, unlike the U.S. Bayh-Dole statutory model, India relies heavily on administrative guidelines, institutional IP policies, sectoral regulators, and foreign-exchange controls to shape transfer practice.[30]

Judicial and tribunal decisions have been formative. The Novartis decision of the Supreme Court (Novartis AG v. Union of India, (2013) 6 SCC 1) confirmed strict patentability thresholds (Section 3(d)), influencing how follow-on pharmaceutical patents are treated in licensing and technology transfer deals and constraining downstream exclusivity.[31] Similarly, compulsory licence proceedings (as seen in the Natco/Bayer disputes and related orders)

[27] AUTM, *FY2020 U.S. Licensing Survey*, available at https://autm.net/surveys-and-tools/surveys/licensingsurvey (last visited 10 Feb. 2026).
[28] J.R. Thomas, *March-In Rights Under the Bayh-Dole Act* (Congressional/academic discussion), available at https://sgp.fas.org/crs/misc/R44597.pdf (last visited 10 Feb. 2026).
[29] The Patents Act, 1970 (India), available at https://ipindia.gov.in/writereaddata/portal/ipoact/1_31_1_patent-act1970-11march2015.pdf (last visited 10 Feb. 2026).
[30] Novartis AG v. Union of India & Ors., (2013) 6 SCC 1; judgment text available at https://indiankanoon.org/doc/165776436/ (last visited 10 Feb. 2026).
[31] Intellectual Property Appellate Board (IPAB) / Controller orders in Bayer/Natco compulsory licence matter; see UNCTAD collection, *Bayer Corporation v. Union of India* (IPAB materials), available at https://unctad.org/ippcaselaw (last visited 10 Feb. 2026).

demonstrate that statutory public-interest safeguards (e.g., Section 84) can materially affect royalty terms, local working expectations, and the security of exclusive rights in sectors critical for public health.[32]

Practically, universities and public labs operate under institutional IPR/TT policies (adopted pursuant to DST/DBT guidelines), which set disclosure, revenue-sharing, and licensing approval mechanics; these institutional rules are decisive because Indian statute leaves many procedural specifics to implementing agencies.[33] Competition law (Competition Act, 2002) and FEMA rules further shape cross-border licensing structures and territorial/royalty arrangements, requiring careful transactional design to avoid regulatory friction.[34]

LESSONS FOR INDIA

A comparison of technology transfer regulation and ecosystems in India and the US contrasts the motivated approach with unique challenges to navigate innovation from research institutions to market. In the US, the Bayh-Dole Act of 1980 was a seminal piece of legislation which enabled universities and other research entities to take ownership of inventions arising from federally funded research. It made technology transfer easier by permitting institutions to sell patents to the private sector, thus promoting innovation and the move of products to market. Differently from the Bayh-Dole Act, there is no overall legislation around public research in India, this creates a regulatory fragmentation and absence of clarity on ownership issues and licensing mechanisms and even its commercialization of IPRs originating from public funding.[35] Technology transfer enterprise in the US is distinguished by strong academia industry and public sector linkage. Universities have robust technology transfer offices (TTOs), which are instrumental in managing IP, licensing agreements, and commercialization. Moreover, a high quantity of venture capital firms, startup accelerators and innovation hubs stimulate the conversion from research results to ready-to-go-to-market products and services. In India, the technology transfer eco-system is however at a nascent stage and there are few institutional capabilities and little channelling between academia and industry. Though many

[32] Department of Science & Technology, *Model Guidelines for IPR Management and Technology Transfer in Academic Institutions* (DST guidelines), available at https://dst.gov.in (last visited 10 Feb. 2026).
[33] Competition Commission of India, *Report / Guidance on IP Licensing and Competition* (selected publications), available at https://www.cci.gov.in (last visited 10 Feb. 2026).
[34] ibid
[35] Kasiva KS, 'Technology Transfer Regulations in India: Key Regulations and Guidelines' (King Stubb & Kasiva, March 14, 2023) <https://ksandk.com/information-technology/technology-transfer-regulations-in-india/#strongtechnology-transfer-regulations-in-india-strong> accessed March 28, 2024

research institutions have set up TTOs in recent years, their performance and the efficient transfer of technology and IP rights are often hindered by bureaucratic obstructions.[36]

1. Enactment of Bayh-Dole Act:

The Bayh-Dole Act became law in 1980, and transformed how technology gets moved from the college campus to the marketplace in this country. Before this law, the results of research that was federally funded belonged to the government – and it could mean red tape and waste in capitalizing on innovations. The Bayh-Dole Act allowed universities, small businesses and nonprofit organizations to take title to inventions made in federally funded research. This reform created incentives for universities to invest in research, and made it easier for inventions to be brought to market, resulting in an explosion of patents, spin out companies and technology transfer licenses.

Key Features of the Bayh-Dole Act:[37]

- **Ownership Rights:** Institutions receiving federal funding can retain ownership of inventions and patents.
- **Commercialization Incentives:** Institutions are incentivized to commercialize inventions, leading to economic benefits and societal impact.
- **Streamlined Licensing Process:** The Act streamlined the licensing process, allowing for quicker technology transfer from academia to industry.
- **Promotion of Collaboration:** The Act encouraged collaborations between academia, industry, and government agencies, fostering innovation ecosystems.

2. Promotion of Collaboration:

Partnership is the key to successful technology transfer in the US. Academic institutes, industry partners and government agencies work together to foster innovation, pool resources and share expertise. Collaborative Research: Industries have collaborative research with the universities where knowledge is co-created, and technology transfer could be facilitated.

[36] *Ibid*
[37] Mowery, D. C., & Sampat, B. N. 'The Bayh-Dole Act of 1980 and university-industry technology transfer: A model for other OECD governments?' Journal of Technology Transfer, 30(2), 115-127 (2005).

Government bodies fund, resource and policy partner to drive collaboration efforts. Industry partners come with knowledge of the market, know-how to commercialize a product, plus opportunities for funding. This collaborative model of translation is driving acceleration of the production -to-market process for new therapies- enhancing opportunities for economic growth and societal benefit.

Key Components of Collaborative Initiatives:

- **Research Partnerships:** Collaborative research projects between academia and industry enable the development of innovative solutions to complex challenges.
- **Technology Consortia:** Industry-led consortia bring together stakeholders from diverse sectors to address common R&D goals and share intellectual property.
- **Government-Industry Partnerships:** Public-private partnerships foster innovation by combining government funding with industry expertise and resources.
- **Entrepreneurial Ecosystem Support:** Collaborations within the entrepreneurial ecosystem, including incubators, accelerators, and venture capital firms, support technology commercialization and startup formation.

3. Streamlined Patenting Process:

Efficient and effective patents are essential in order to create the right incentives for innovation, as well as to protect intellectual property. In the U.S., measures including efforts to harmonize the Patent Cooperation Treaty (PCT) and implementation of the America Invents Act (AIA) have simplified application procedures, lifted burdens on office personnel, and improved patent quality. Other patent authorities such as the European Patent Office (EPO) and United States Patent and Trademark Office" (USPTO) provide provisions for fast-tracked examinations, PPH agreements, and programs to expedite examination to speed up the grant process for pioneering inventions. These faster, simplified processes assist inventors and institutions in securing patents more quickly which can in turn help facilitate technology transfer and commercialization activities.[38]

[38] Sushree Dash and Arindam Mahapatra, 'Comparative Study of University – Industry Technology Transfer in EU, US, UK, India," 4 (3) IJLMH Page 5767 - 5783 (2021), DOI: https://doij.org/10.10000/IJLMH.111180

Key Aspects of a Streamlined Patenting Process:

- **Expedited Examination Programs:** Fast-track options and expedited examination programs expedite the patent application process for inventions with significant commercial potential.

- **Patent Prosecution Highway (PPH) Agreements:** PPH agreements between patent offices enable applicants to leverage the examination results of one patent office to expedite examination in another.

- **Prioritized Examination:** Prioritized examination options prioritize the examination of patent applications related to technologies of strategic importance or public health significance.

- **Enhanced Patent Quality:** Measures to enhance patent quality, such as rigorous examination procedures and post-grant review mechanisms, ensure that granted patents provide meaningful protection for inventions.

But there is room for improvement by reforming policies, TTOs and networking among academia, industry and government. Through learning from the US experience and meeting these challenges, India can establish a conducive environment for technology transfer, innovation and economic development. By taking strategic actions, making investments and establishing partnerships, both nations can leverage technology transfer to meet public needs and promote prosperity in the digital age.

CONCLUSION

This analysis has shown that the legal framework governing patent-based technology transfer is a significant determinant of how efficiently public investment in research is translated into usable economic and social benefits. Some commonalities are highlighted through a comparison of India and the United States, suggesting that clarity in statute, institutional independence and regulatory coherence play a key role in the success of technology-transfer efforts. The experience of the US under Bayh-Dole Act also confirms that a clear regime for ownership, disclosure obligations and structured licensing authority can align incentives between universities and researchers on the one hand, and industry, but without riding roughshod over public-interest defences. Judicial construction and administrative

interpretation have also rendered this framework more stable, bringing predictability to stakeholders in the commercialisation field. The Indian practice, on the other hand, is indicative of a divided regulatory regime codified by patent laws, contract laws, foreign exchange regulations competition law and executive action concerning technology transfer. Although this multiplex model provides political institutions with key public-interest checks, in the form of compulsory licensing and antitrust review, it has also raised questions about ownership, institutional responsibility and licensing discretion after publicly funded research. According to case law and policy practice, the lack of a coherent statutory model has hampered the efficacy of institutional technology-transfer mechanisms and inhibited scaling up research results. The paper argues that India doesn't need to follow the Bayh-Dole model of intellectual property management in a literal sense. Rather, it suggests selective statutory interventions to improve the ownership of inventions funded by public money. This includes developing the capacity of technology transfer offices, standardizing protocols for disclosure and licensing, and ensuring that contracts comply with competition laws. The authors advocate for a balanced reform strategy that integrates patent law with effective institutional governance and market regulations. Ultimately, they emphasize the necessity of establishing a coherent and predictable technology transfer system to enhance public research investment, which in turn would foster innovation-led economic growth and overall societal welfare.