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Analysing India's National Education Policy from the Angle of Research, IP, Innovation, and Entrepreneurship

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The National Education Policy 2020 is a fantastic move by the Indian government to transform the educational system. The aim to make higher education more multidisciplinary and comprehensive like making curriculum more adaptable, developing e-courses in regional languages, and introducing skill-development course are appreciated. However, the policy does not specifically mention intellectual property, innovation, and entrepreneurship—key elements of transferring higher education institution into a research and innovation focussed institution, which is the need of the hour. The current study looked at the role of intellectual property, research, innovation, and entrepreneurship and made some recommendations on how to integrate them into academic curricula so that NEP's goals can be met fully and faster.

Keywords: National Education Policy, 2020, Research, India, Intellectual Property, Innovation, Entrepreneurship

In July 2020, India's Union Cabinet approved the new National Education Policy (NEP) that aims to establish a holistic system for elementary, secondary, and higher education as well as vocational training. The vision is to create an India-centric education system that directly contributes to our nation's long-term goal of transformation into a just and vibrant information society by providing high-quality education to all. This is the third policy since India got independence in 1947. Previously, two education policies were introduced in the year 1968 and 1986.[1] There have been several discussions on the pros and cons of the policy and the possible implementation strategy.[2–8] The current study, for the first time, analyses the policy from the angle of research, intellectual property (IP), innovation, and entrepreneurship; as well as how integrating these elements into academic curricula might help NEP 2020 meet its target faster.

Research, IP, Innovation, and Entrepreneurship in Academia

Global scenario

According to the US Commerce Department, IP-intensive industries contributed to the creation of at least 45 million jobs and account for more than $6 trillion (38.2% of US GDP).[9] IP also plays a significant role in university rankings around the world. The following are some examples of how the world's best universities create IP and make good use of it. Table 1 shows top 10 universities with patents in the year 2020.[10] MIT and Stanford respectively earned a licensing revenue of $72.8M and $114M in 2020. They also created respectively 32 and 22 startup companies in the same year.[11,12]

Indian Scenario

In the area of intellectual property, India lags well behind the top universities of the world. India is ranked 40 out of 53 countries in International IP Index 2021. According to the 2021 International IP Index, economies with the most active IP systems are more likely to gain the socio-economic benefits needed to combat COVID-19, such as increased access to venture capital, increased private sector investment in R&D, and over ten times more clinical trial operations.[13] India also ranked 46th in the Global Innovation Index 2021 published by the joint collaboration of Cornell University, INSEAD, the World Intellectual Property Organization (WIPO), and their Knowledge Partners.[14] The following data have been obtained from the Annual Report of the Indian Patent Office (IPO) for the year 2019-2020[15]. Table 2 shows the top 10 Indian universities that have filed patent applications at the IPO. As can be seen, most of the organizations are private academic institutions. It is to be noted that these numbers

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correspond to the filing, and not grant/issue. On the other hand, the top universities provide the number of granted patents on their websites (Table 1).

The number of domestic applications is higher under the category of natural persons, start-ups, and small entity (Table 3). However, foreign applicants under 'Other than natural person' category 3.5 times that of the domestic applicants. The total number of active patents in 2019-20 is 81279, out of which only 16181(19.9%) have been reported to be working or commercialized.[15]

Role of IP in Indian University rankings

IP is also given a weightage in India's National Institutional Ranking Framework (NIRF) and Atal Ranking of Institutions on Innovation Achievements (ARIIA) rankings**.** The top institutions under these ranking and the number of patents filed by them are shown in Table 4.

Since the ranking framework considers the IPR data for previous three years for the current edition i.e., from 2017 to 2020, the patents filed in that duration has been fetched from the ip India website.

Analysis and Discussions on National Education Policy 2020

The suggestions and recommendations provided below are based on some of the best IP practices in top universities around the world, and the discussions and notes exchanged with team members of DST Centre for Policy Research at Panjab University Chandigarh on the National Science, Technology and Innovation Policy (STIP) 2020. Implementation of these may improve the innovation ecosystem in the higher education institutions.

Introducing IPRs in all Levels of Education

The NEP 2020 talks about creating a research mindset in students and academia. To make that dream come true, it is required to start teaching the importance of IP, innovation, and entrepreneurship from the school-level to doctoral level. The United States Patent and Trademark Office provides some excellent resources for kids and teens to learn about IP[1617]. The database also provides learning materials

Table 1 —Top 10 global universities with granted patents in 2020

Serial No.	University	Patents Issued in 2020
1	University of California	597
2	MIT	433
3	Stanford University	264
4	University of Texas	207
5	John Hopkins University	185
6	Purdue Research Foundation	175
7	Wisconsin Alumni Research Foundation	162
8	California Institute of Technology	156
9	Tsinghua University	155
10	Harvard College, President and Fellows	154

Table 2 — Top 10 Indian universities for patents at IPO for the year 2019-2020

Rank	University/ Institute	No. of patents filed
1	Indian Institute of Technology (Collective)	664
2	Lovely Professional University	442
3	Chandigarh University	400
4	Bharath Institute of Higher Education and Research	251
5	Chandigarh Group of Colleges	210
6	Amity University	179
7	Sanskriti University	150
8	Siksha O Anusandhan (deemed to be university)	101
9	Shoolini University of Biotechnology and Management Sciences	80
10	SRM Institute of Science and Technology	56

Table 4 — Top Indian institutes and patents filed by them (IITG, JNU, and BHU did not participate in ARIIA)

NIRF Ranking 2020	Institute	Patents filed between 01.04.2017 to 31.03.2020 at IPO	ARIIA Ranking 2020
1	IITM	307	1
2	IISc	177	4
3	IITD	204	3
4	IITB	293	2
5	IITKGP	131	5
6	IITK	188	6
7	IITG	63	—
8	IITR	44	9
9	JNU	25	—
10	BHU	83	—

Table 3 — Filing statistics by domestic and foreign applicants 2019-2020

Natural person		Startup		Small Entity		Other than natural person		Total		Grand Total
Domestic	Foreign	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign	
8792	1182	1650	2	576	272	9825	33968	20843	35424	56267

for parents and teachers in elementary, middle, and high school level. The schools in Israel teach entrepreneurship curriculum for kids and the program is being customized and adapted in several other countries.[18]

Introducing Young Inventor Scheme for Students as well as General Public

To nurture the culture of creativity and IP and to encourage students/general public to file patents, a scheme of Student or Young Innovator may be launched. Under this scheme, they can be mentored on how to file patents for their inventions. Financial assistance can be provided for the selected meritorious ideas for establishing proof of concept and prototype development, validation, and patent filing. Once the patent is granted, they can be given an award of Young Inventor by the Education Department of the State. Such initiatives are regularly practiced in some of the top universities in the world.[19] In 2017, the YouGov initiative was taken up by the UK to carry out independent Research with 18- to 30-year-olds who were not in employment, education or training, or in a form of insecure or under-employment.[20]

Dedicated IPR Cell and IP Policy in Academic Institutions

All top universities in the world have their dedicated IP cells or technology transfer offices.[11,12,21] Indian universities and institutions undertaking R&D should have dedicated IP/Tech-Transfer/ Industry-Academia collaboration Cells managed by professionals and experts. Each institute should have a dedicated IPR Policy to lay down the policy framework and guiding principles related to IP ownership, IP Sharing, IP Maintenance, IP Conflict, and IP Commercialization. Institutes may seek help from organizations having well-drafted institutional IP Policy.[22–24]

Creation of Separate Dedicated 'Corpus Fund' for IP Activities

It is suggested that MoE may create an 'IP Fund' which could be used for IP related activities of the universities, which will also make the universities less dependent on the state and central government for financial assistance. In the USA, America's Seed Fund - the Small Business Innovation Research/ Small Business Technology Transfer (SBIR/STTR) programs enable the transition of university-based research.[25]

Assessment of Research/Project for Patent Generation

An essential criterion for getting a patent is that the invention should not be in the public domain. It is important to have the research output assessed first for patentability before sending it to a journal. If found patentable, an invention should be first filed for a patent. Once it is filed, the priority date of the invention is secured and the researcher is free to send it for a journal publication. An excellent explanation on this topic can be found on the University of Toledo's technology transfer page as it deals with the idea of publish and perish.[26] The screening of a manuscript for patentability before publication will surely increase the IPR filing rates. Also, the culture of patenting is to be nurtured in the universities by giving a due weightage for patents published/granted to the researcher.

Introducing IPR in the Research Methodology of PhD Students

An IPR course should be made mandatory part of the PhD coursework curriculum. In each PhD Thesis, there should be one chapter on prior-art search and patentability search and analysis on the given research problem in the PhD thesis. It will be helpful for future researchers to understand and work upon the grey areas.

Filing Patent Application Mandatory for Awarding PhD Degree in Applied Sciences

The patent filings in our country are very meagre compared to our population and research publications. According to the World Bank Data, India is the third largest producer of scientific and engineering articles in the world.[27] Table 5 shows the publication strength and GDP of countries.

Therefore, the filing of Patent application may be made mandatory before awarding PhD degree to students from applied science areas.

Incentives for Researchers for Filing Patents in Universities

It has been found that universities that grant higher royalty shares to academic scientists generate more inventions and higher levels of license income.[30] To encourage the patent filings, the researchers/faculty may be given better incentives. It may be in the form of one Indian patent granted is equal to 3 peer reviewed papers and 6 peer reviewed papers for a PCT patent for their career advancement/promotions. Awards may be given for highest number of patent

Table 5 — Peer-reviewed articles published by countries

Country	No. of articles published in 2018[27]	Global share of publications	No. of patent applications filed in 2018[28,29]	Paper:Patent	Nominal GDP (in Trillions)	No. of patents filed/$100B GDP
China	5,28,263	20.67%	15,40,000	1:2.9	$14.72	1,04,619
United States	4,22,808	16.54%	5,97,141	1:1.4	$20.89	28,585
India	1,35,788	5.31%	50,055*	2.7:1	$2.66	18,817
Germany	1,04,396	4.08%	67,898	1.5:1	$3.85	17,635
Japan	98,793	3.87%	3,13,567	1:4.5	$5.06	61,969
United Kingdom	97,681	3.82%	20,931	4.7:1	$2.76	7,583

**Patent applications filed by domestic applicant at Indian patent office are around 17,005.* Therefore the paper: patent ratio by Indian applicant is 8:1.

filings and highest revenue earned by patent commercialization by the researcher/faculty member. The Govt may bear all the expenses for the first patent filing for an Indian citizen.

Incentivize Institutions Excelling in IP

Institutions/Universities engaged in the promotion of patent ecosystem (generation of IP, introducing IPR as a subject at undergraduate, postgraduate and pre-PhD coursework, setting up IPR chair, holding symposia/seminars/workshops in IP) should be incentivized by the government by way of providing special grants (including recognition and accolades) to the concerned institutions.

Establishing IPR Academy

An IPR academy can be set up for online learning resources, seminars and training about IP in India in association with WIPO. A similar initiative can be found at the Canadian Intellectual Property Office and IP office of the Philippines.[31,32]

Faculty Development Program on IPR for Teaching Community

In the current era of pandemic, it is quite useful to design online courses targeting every citizen of our country. Unless the teaching community is IPR savvy, it cannot emphasize the importance/necessity of IPR to the students/researchers.[33–35] A 'Faculty Recharge IPR Programme' for university faculties should also be initiated.

Coordination between National Research Foundation (NRF) and DPIIT IPR Chairs

The Govt has recently allocated Rs 50 Crores for NRF to promote research innovation in the HEIs. When funding an applied research project, the NRF should emphasize the importance of filing IPRs out of the R&D outcomes. In addition, the NRF may include IPR Chairs in project review and monitoring committees so that they can mentor the researchers/ PIs on IPR issues. The National Science Foundation in the US and the Chinese Academy of Sciences in China play similar roles.[36]

Linkages of Universities with NRLs and Industries

To enhance the R&D output of the three sectors i.e., universities, R&D institutes, and industries, it is recommended that each institute of a particular sector (e.g., university) should be mandated by the government/funding agencies to partner with other two sectors (e.g., R&D institute and R&D unit of the industry). Such triple helix partnership will boost the scope of applied research/patents/technologies in India and further commercialization of patents and technologies will ultimately be improved.

Bringing Indian Bayh-Dole Act

Bayh–Dole Act in the US permits academic institutions to own patents resulting from publicly funded research. Therefore, American universities have become more engaged in the commercialization of their research[37]. The Indian version of the Bayh–Dole Act, borrowing the major portion of the US enactment, proposed through the bill entitled 'Protection and Utilisation of Public Funded Intellectual Property Bill, 2008′ was rejected in 2011. Acts like Bayh Dole may provide greater autonomy and encourage IP creation and commercialization.

Conclusion

Quality education with values and skills is essential for national growth and the development of a just and equal society. As India progresses toward becoming a developed country and one of the world's largest economies, there is an increasing demand for intellectual property creation, protection, and commercialization. The human civilization has been developed and transformed only by developing IP and

innovations and effectively implementing them. The National Education Policy is a fantastic move by the Indian government to transform the educational system. However, it makes no specific mention of intellectual property. The current study looked at the role of intellectual property, research, innovation, and entrepreneurship in today's world and made some recommendations on how to integrate them into academic curricula so that NEP 2020's goals can be met faster.

References

1 Kumar K, Prakash A & Singh K, How National Education Policy 2020 can be a lodestar to transform future generation in India, *Journal of Public Affair*, 2020.

2 Aithal P & Aithal S, Implementation strategies of higher education part of National Education Policy 2020 of India towards Achieving its Objectives, *International Journal of Management, Technology, and Social Sciences*, 5 (2) (2020).

3 Aithal P S & Aithal S, Analysis of the Indian National Education Policy 2020 towards achieving its objectives, *International Journal of Management, Technology, and Social Sciences*, 5 (2) (2020) 19–41, doi:10.47992/ijmts.2581.6012.0102.

4 Sharma B P & Sharma J, National Education Policy-2020: Challenges and strategic options, *Association of Indian Universities*,59 (15) (2021).

5 Mittal P, Implementing National Education Policy-2020: Restoring India's status as a Viswa Guru, *Association of Indian Universities*, 59 (15) (2021).

6 Gupta S & Garg S, National Education Policy-2020: Innovations in higher education and quality assurance, *Association of Indian Universities*, 59 (6) (2021).

7 Patwardhan B, Mohanan K & Mohanan T, Higher education in India: Vision, purpose, policy and strategy, *Association of Indian Universities*, 59 (15) (2021).

8 Sharma A, Bhardwaj A, Pruthi M & Sharma M, Intellectual property rights in context of New Education Policy 2020, *Journal of Intellectual Property Rights*, 27 (6) (2022) 415-419.

9 U.S. Department of Commerce Releases Updated Report Showing Intellectual Property-Intensive Industries Contribute $6.6 Trillion, 45.5 Million Jobs to U.S. Economy, *Commerce.gov*, 2017.

10 Top 100 Worldwide Universities Granted U.S. Utility Patents in 2020, *National Academy of Inventors* NAI-IPO-Top-100-Universities-Granted-U.S.-Utility-Patents-2020.pdf, 2020.

11 SOTL, Intellectual Property, *Stanford Office of Technology Licensing*, https://otl.stanford.edu/intellectual-property/stanford-policies.

12 MTLO, Intellectual Property, *MIT Technology Licensing Office*, https://tlo.mit.edu/field-collection/field-header-and-body/8284.

13 USC, U.S. Chamber 2021 International Ip Index, https://www.theglobalipcenter.com/report/ipindex2021/, 2021.

14 Global Innovation Index (GII), https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2021.pdf, 2021.

15 IPO, Annual Report 2019-2020, *Intellect. Prop. India J.*, 2020.

16 USPTO, Middle School Resource Guide, 2018.

17 USPTO, IP is everywhere, https://www.uspto.gov/kids/kids.html.

18 Entrepreneurship for Kids Program in Israeli Schools and Abroad, https://www.tomorrowsuccess.com/schools.html.

19 Tenn T, Student Innovator Award 2020, *Berkeley School of Optometry*, https://optometry.berkeley.edu/student-innovator-award-2020/, 2020.

20 Innovate UK, Introducing the young innovators, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/713807/18.1134.002_Young_Innovators_brochure_Web_enabled_PDF_FINAL_5.2MB.pdf, 2018.

21 HOTD, Protecting Intellectual Property, *Harvard Office of Technology Development* https://otd.harvard.edu/faculty-inventors/protecting-intellectual-property/.

22 IPR Policy of IIT Madras, https://icandsr.iitm.ac.in/ipr/news/IPR policy.pdf.

23 IP Policy of IIT Bombay, https://www.ircc.iitb.ac.in/IRCC-Webpage/rnd/PDF/Final_IITB_IP_PolicyDocument.pdf.

24 IP Policy of IIT Kharagpur, http://www.sric.iitkgp.ac.in/docss/ippolicy.pdf.

25 Association of University Technology Managers I, Technology Transfer Infographic. *Association of University Technology Managers, Inc.* https://autm.net/surveys-and-tools/tech-transfer-infographic.

26 UT, PUBLISH AND PERISH, *University of Toledo*, https://www.utoledo.edu/research/TechTransfer/Publish_and_Perish.html.

27 McCarthy N, The countries leading the world in scientific research. *World Economic Forum* https://www.weforum.org/agenda/2020/01/top-ten-countries-leading-scientific-publications-in-the-world/, 2020.

28 World Intellectual Property Indicators: Filings for Patents, Trademarks, Industrial Designs Reach Record Heights in 2018, *WIPO Press Release*, https://www.wipo.int/pressroom/en/articles/2019/article_0012.html, 2019.

29 Facts and Figures 2018, *IP Office of the UK*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/841722/facts-and-figures-2018.pdf, 2019.

30 Lach S & Schankerman M, Incentives and invention in universities, *National Bureau of Economic Research*, 2003.

31 IP Office of the Phillippines, IP Academy, https://www.ipophil.gov.ph/ip-academy/.

32 Canadian Intellectual Property Office. IP Academy, https://www.ic.gc.ca/eic/site/cipointernet-internetopic.nsf/eng/h_wr04234.html.

33 Pushkar P, Role of teacher in higher education, *International Journal Education and Information Studies* , 5 (2015) 25–30.

34 ICT Academ, Developing the next generation teachers, http://www.ictacademy.in/pages/faculty-development.aspx.

35 UG. Guidelines for the Special Scheme of Faculty Development Programme for Colleges for the Twelfth Plan (2012-2017) University Grants Commission New Delhi – 110 002 Guidelines for the Scheme of Faculty Development Programme for Colleges, 2017.

36 Yi W, Shu F & Dengshuo Z, The structure and construction of the Intellectual Property Network of the Chinese Academy of Sciences (CAS), *World Patent Information*, 33 (2011) 81–84.

37 Arora A, Belenzon S & Patacconi A, Papers to patents. *Nat. INDEX*, 2017.