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

Anindya Roy Chowdhury† and Purushotham Hanumanthu
Centre for Intellectual Property Rights, Andhra University, Visakhapatnam — 530 003, Andhra Pradesh, India

Received: 7th January 2022; accepted: 3rd February 2023

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. There have been several discussions on the pros and cons of the policy and the possible implementation strategy. 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). 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. 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.

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. 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. The following data have been obtained from the Annual Report of the Indian Patent Office (IPO) for the year 2019-2020. 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

---

†Corresponding author: Email: anindyaa.roychowdhury@gmail.com
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 IP1617. The database also provides learning materials

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

15 Role of IP in Indian University rankings

16 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 IP1617. The database also provides learning materials

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

15 Role of IP in Indian University rankings

16 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 IP1617. The database also provides learning materials

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

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. 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.

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