

Executive Summary

Innovation is heart of promoting competition and economy of a country. Along with industries, Higher Education Institutions (HEIs) —public and private universities and research institutions (RIs) play a crucial role in generation of new ideas, knowledge, and innovation. The knowledge generated and disseminated by HEIs are utilized by industries to innovate their processes and products for improved productivity which leads to promotion of national economy. While teaching and research are primary and secondary missions of HEIs respectively; the third mission —contribution of HEIs' potential to the national economy from their innovative and commercially viable research and development are not given much importance due to lack of supportive policies & requisite budget allocations. The increased need for global competitiveness made commercialization of HEI generated research inevitable and eventually paved way for development of R&D, IPR and national innovation policies to support such activities at HEIs.

In this aspect, western countries, among them, USA and European countries are pioneers in identifying the potential of research and development (R&D) and strength of Intellectual Property (IP) generation by HEIs; prioritized it by formulating national IPR, R&D and HEI IP policies suitable for their third mission/social mission envisaged. Strengthening of the IP system to protect the IP, formulation of supporting IP policies for the promotion of IP awareness, and enforcing the IPR are important aspects to make HEIs contribute to the national economy efficiently. National IPR policies identify the strengths and weaknesses of the National Innovation System (NIS) and provide the needed technological framework balancing competition and societal benefits.

In India, the first National Intellectual Property Rights Policy was launched on May 12, 2016, by the Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry, Government of India. It aims to address some of the drawbacks of the IP system and laid objectives to foster innovation and protection of IPR in India. The policy emphasized for promotion of awareness, capacity building, generation, and commercialization of IP at HEIs. This study aims to understand the status of procedures and facilitations made by HEIs following broad objectives of National IPR policy.

This study explores institutional research and innovation practices and IP policy of different HEI typologies —Central and State government universities, Private Deemed, Institutions of National Importance (INI), and Research Institutions (RIs) in India and finds correlation between their collaborations and IP generation and innovation. It further explores for barriers towards IP generation, commercialization and technology transfer from the perspective of IP management of

HEIs. It also studies the strategies and focus of top management in the promotion of IP and innovation at HEIs.

The study was designed in a qualitative approach at the institutional level with a structured questionnaire tool. IP cell/Technology Transfer Office (TTO) managers, registrars, R&D dean/directors of respective HEIs are participants in this questionnaire-based survey. The purposive sampling technique was used to choose the sample of HEIs from the University Grants Commission (UGC) approved list. Sampling of HEIs for data collection was done in two phases. First, the top 100 National Institutional Ranking Framework (NIRF) ranked HEIs were selected to deploy the questionnaire. In the second phase, other UGC-approved central and state universities, Private Deemed universities, and Institutions of National Importance (INI) and research institutions (RIs), were chosen to deploy the questionnaire. The questionnaire consists of open-ended, dichotomous, multiple-choice, and Likert-scale questions framed as per the study objectives specified. The questionnaire made using Google forms were sent through e-mail along with Participant Information Sheet (PIS) to the participants of sampled HEIs.

Analysis of survey was made based on 71 responses received in the survey. It was found that research and innovation practices, support systems, and IP policies of HEIs are evolving.

Among all types of HEIs studied, INI are embraced with successful research and innovation practices, and support systems towards the IP generation and commercialization goals envisaged; However, this observation is restricted only to a few INI which are more than 25 years old and IP policies implemented much earlier than others. Most of the INI IP policies were implemented during 2000-2020. Despite of having government funded IP cells, IP policies implemented and support systems provided in INI which are less than 25 years old, they did not support for fruitful collaborations with industries leading to joint patent applications and IP commercializations. Newly established INI lack IP cells and policies, and committees for policy implementation. Innovation practices, IP ownership and revenue sharing terms of implemented IP policies in these INI are not motivating institutional researchers during collaborated R&D projects (Industrial Consultancy and sponsored). They do not have specific budget allocations to IP cells for filing and maintenance of IP. Among INI, age of the institution and age of the IP policy implementation have significant positive correlation with successful innovation output; Older the institution and established IP cell, and earlier the implementation of IP policy, better the innovation output. Positive correlation between collaborations and research and innovations is seen only in few older INI, but collaborations did not promote innovation output in other less older INI. There is no

clear evidence supporting promotion of innovations with geographical location and size of the collaborated industry. No specific budget allocation for IP cells, lack of incentives and funding are seen as major barriers for IP generation and commercialization. Among all types of HEIs, INI's top management have more vested focus on commercialization of IP and promoting collaborations to enable it.

Next to INI, Private Deemed universities are more inclined towards promoting innovations towards their social mission. Unlike INI, despite of lacking government funded IP cells, they have research and innovation practices, IP policies and support systems established commensurate with their research and IP generation, but annual budget allocation to IP cell and its activities are meagre. Unlike INI, there is no observable correlation between age of the institution, IP cell and IP policy implementation towards successful generation and commercialization of IP. Institutional practices of private deemed universities towards innovation varies significantly with INI. Screening of research results for protection of IP is occasionally done by IP cell coordinator before publishing it. Most of their IP cells have approximate annual budget less than 10 lacs.

Research Institutions (RIs) are embraced with successful research and innovation practices, and support systems towards the IP generation and commercialization goals envisaged; However, this observation is restricted only to a few INI which are more than 25 years old and IP policies implemented much earlier than others. Most of the INI IP policies were implemented during 2000-2020. Despite of having government funded IP cells, IP policies implemented and support systems provided in INI which are less than 25 years old, they did not support for fruitful collaborations with industries leading to joint patent applications and IP commercializations. Newly established INI lack IP cells and policies, and committees for policy implementation. Innovation practices, IP ownership and revenue sharing terms of implemented IP policies in these INI are not motivating institutional researchers during collaborated R&D projects (Industrial Consultancy and sponsored). They do not have specific budget allocations to IP cells for filing and maintenance of IP. Among INI, age of the institution and age of the IP policy implementation have significant positive correlation with successful innovation output; Older the institution and established IP cell, and earlier the implementation of IP policy, better the innovation output. Positive correlation between collaborations and research and innovations is seen only in few older INI, but collaborations did not promote innovation output in other less older INI. There is no clear evidence supporting promotion of innovations with geographical location and size of the collaborated industry. No specific budget allocation for IP cells, lack of incentives and funding are seen as major barriers for IP generation and commercialization. Among all types of HEIs, INI's

top management have more vested focus on commercialization of IP and promoting collaborations to enable it.

Central universities mission, objective of research and innovation practices, and support systems are not inclined towards the IP generation and commercialization goals. Most of their IP policies were implemented during 2014-2018. They mostly have self sustained IP cells, and IP committees are not constituted or still under process. Innovation practices, IP ownership and revenue sharing terms of implemented IP policies in these HEIs are not motivating institutional researchers during They do not have specific budget allocations to IP cells for filing and maintenance of IP. There is no clear evidence supporting promotion of innovations with geographical location and size of the collaborated industry. No specific budget allocation for IP cells, lack of incentives and funding are seen as major barriers for IP generation and commercialization. Central university top management have no vested focus on promotion of IPR and collaborations.

State universities research and innovation practices, and support systems towards the IP generation and commercialization goals envisaged are little among all HEIs; Most of the State universities IP policies were implemented during 2005-2018. Despite of having government funded IP cells, IP policies implemented and support systems provided, they did not support for fruitful collaborations with industries leading to joint patent applications. They do not have specific budget allocations to IP cells for filing and maintenance of IP. Age of the institution and age of the IP policy implementation have no correlation with successful innovation output as most of their policies are only about 10 years old. Not all their IP cells are funded by government. Not all have a committee constituted for reviewing IP policy and promoting their IP. Their IP policy is not available on website and no periodical updates on IP related data. They do not have sufficient prefabricating support systems for making prototypes. IP policy and institution support systems did not promote fruitful collaborations with industries. No specific budget allocation for IP cells, no formal/informal practices for screening and processing of potential innovations, lack of incentives and funding are seen as major barriers for IP generation and commercialization. The mission and objective of research in State and Central universities are not focused on protection and exploitation of research output.

Overall, though there is an indication that Indian HEIs are transforming towards the third mission goal by absorbing the national policy objectives and protecting their IP with formulated institutional IP policies, inadequacy and inefficiency of intellectual capital of HEI and innovation schemes launched by government are becoming barriers hindering the IP generating and

commercializing enablers in HEI ecosystem. Despite having a significant positive change in the innovation practices of HEIs during the decade of innovation, there is no proportionate change in the HEIs' innovation output due to lack of supporting organization culture. Though IP policies formulated, implemented and committees constituted, they did not add significance to institutional R&D support systems for fruitful collaborations leading to IP generation, commercialization, and technology transfer. As most of the institutional research and IP policies formulated are mere emulations of best performing HEIs' which are not tailor-made as per the innovation strengths and needs of the HEIs, it could not create efficient innovation linkages. It further lead to the creation of a non-competitive environment in the HEI ecosystem. The non-competitive environment could not facilitate motivating incentives for researchers and stakeholders. Adding to this, organization structure, complementary business assets and management focus are not on compliance with the mission and goals of their stated IP policy of HEI. Researchers' unawareness on IPR added to the little budget allocation to IP cells and HEIs' organizational policies of researchers career advancement which gave emphasis to research publications with impact factors created a demotivated environment for researcher to choose the path of protecting their IP and commercializing it. NIRF ranking methodology provided scores for IP filings and grants; though it promoted patent filings number in most of the HEIs, quality of patents has reduced which caused IP commercialization impossible. Lack of full time IP professionals and limited/no specific budget for IP cells made them to file limited patent filings though many potential ideas are disclosed to IP cells and no fulltime staff in IP cell is a reason for non-maintenance of records of working, non working, lapsed and invalidated patents at their HEIs. Except few INIs, role of technology transfer offices in funneling the viable IPR to create market value in HEIs is scanty. As NIRF ranking is making a positive change in the focus of top management for facilitating innovation needs, it should take measures to promote quality of innovation output by adding and emphasizing IPR indicators strategically to enhance quality of generated IPR.